A STREET & SMITH PUBLICATION

ASTOUNDING Science-Fiction

REG. U. S. PAT. OFF.

NOVEMBER 1944

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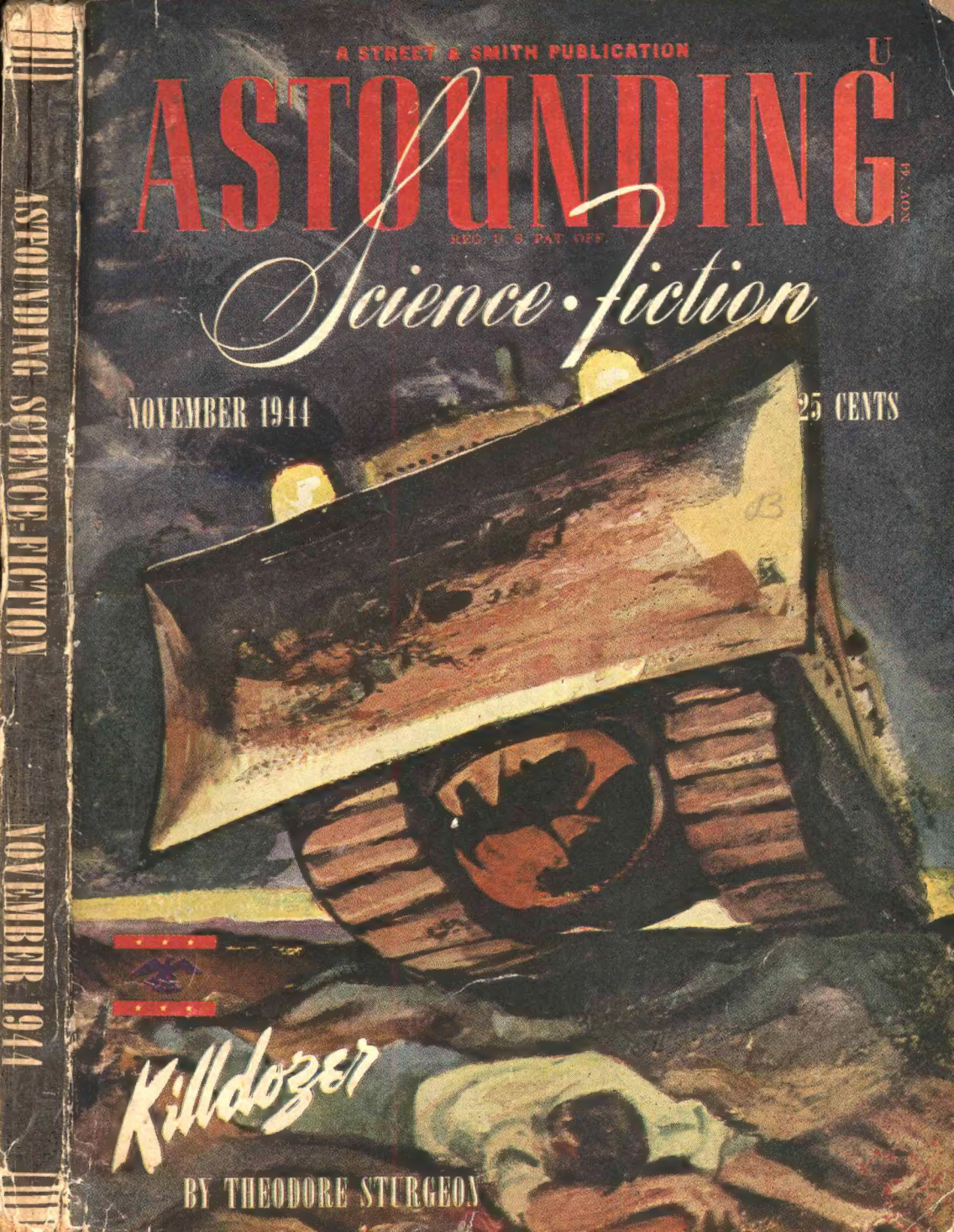

Killdozer

BY THEODORE STURGEON

ASTOUNDING SCIENCE-FICTION NOVEMBER 1944

This time you'll listen to ME, Sonny Boy!

1 MOMMA WAS LOSING PATIENCE WITH ME AGAIN. She says: "I'm getting plenty sick of you looking like Flaky Joe, Hair's Horrible Example! And I'm tired of you spending money for a lot of junk that doesn't help. You'd never listen to me who has been a nurse most of her life, *but you'll listen this time, Sonny Boy!*"

2 "THIS PROVES WHAT I'VE TOLD YOU for months," she went on. "You've got a case of infectious dandruff that ought to have repeated Listerine Antiseptic treatment and persistent massage. I've seen the records on the Lambert research, and I know what Listerine Antiseptic can do in killing the 'bottle bacillus.' And so, Baby, we're starting right now!"

3 EVERY MORNING AND NIGHT SHE HERDED ME into the bathroom and doused on Listerine Antiseptic. Then she followed it with a swell, vigorous massage. Boy! Did my scalp feel like a million. And the way those ugly flakes and scales began to disappear is nobody's business. What a treatment!

4 "YOU'RE ALMOST HUMAN AGAIN," she said a few weeks after, "and your hair looks like it used to. After this, maybe you'll listen to Momma when she tells you that you ought to use Listerine Antiseptic, every time you wash your hair, as a precaution against the infection coming back." Will I listen? You said it!

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At the same time it helps to get rid of those ugly flakes and scales and alleviates itching. Your scalp glows and tingles and your hair feels wonderfully fresh. In tests, this twice-a-day treatment brought complete disappearance of, or marked improvement in, the symptoms of dandruff within a month to 76% of dandruff sufferers. Listerine Antiseptic is the same solution that has been famous for over sixty years in oral hygiene

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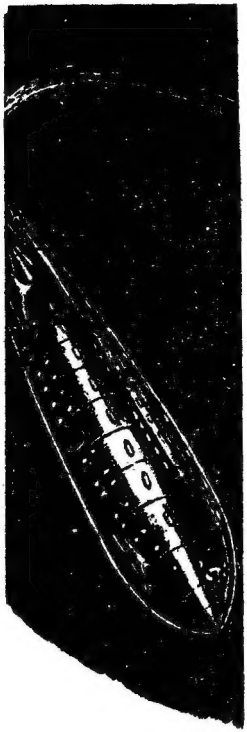

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CRT

When broadcast radio first advanced beyond the crystal detector days, the triode amplifiers were the only type available—the UX-201-A and its brethren of dear memory. And I do mean dear—seven dollars a tube, they were, with a service life guaranteed to be all of one hundred hours. They were popularly known as bulbs—and why not? They lighted up like a lamp bulb—and it took a storage battery to run 'em.

When this war began, the cathode ray tube—the CRT—was straggling out of the high-powered pure-science laboratory into the engineering research departments of the electronics industries. They'd even gotten into some consumers' goods—the television sets.

Cathode ray tubes sell by the inch—the inch of screen diameter. One modified, simplified type of cathode ray tube had gotten very wide sale and application—the familiar greenish "Magic eye" tuning device is a small triode amplifier combined with a simplified cathode ray tube. But the type of tube that has the greatest usefulness contains an accurately made and aligned electron gun in a large glass tube shaped rather like an overgrown ice cream cone, ending in a flat, or near-flat end coated internally with a fluorescent material. The smallest size commercially produced before the war was a 1-inch miniature; the largest a 12-inch job used in the larger television sets. The 1-inch miniature was extremely popular with radio "hams," since it made it possible to check the modulation patterns of their transmitters, and sold for a reasonably attainable price. The size was too small for most purposes, however.

But the 2-inch, 3-inch, 5-inch, 7-inch, 9-inch and 12-inch sizes increased in price at an exponential rate. Also, and worse, the power supply required, and the danger and delicacy of the tube and its associated apparatus increased exponentially. The 1- and 2-inch sizes could be powered from ordinary 400-volt receiver-type power supplies. The 5-inch tube calls for a 2000-volt power supply—which happens to be about the standard electric chair voltage. The 12-inch job requires about 10,000 volts. Apparatus properly designed and built can be perfectly safe, but the amateur couldn't afford the special transformers, assorted high-voltage equipment, and the like. The receiver-type transformer sells for under five dollars because they're made by the million; the cathode ray transformers sell for twenty dollars or so because they're made practically by hand on special order—or were!

The cathode ray tube is coming into real use now—the war did it. Essentially, the cathode ray tube is a direct, visual indicating device which can show three different elec-

trical values simultaneously and instantaneously—it is quite capable of following frequencies from zero —DC—to 20,000,000 cycles or so. A spot of light produced on the fluorescent screen can be shifted by applying electric potentials to electrostatic deflection plates, or electric current to magnetic deflection coils, in vertical or horizontal directions or combinations; the intensity of the spot can be varied by applying potential to a controlling grid. The cathode ray tube is, actually, a triple voltmeter.

But modern electronics has devices, circuits and systems that can convert almost any measurable quantity, quality, or property into electrical variations. Sound becomes varying electrical currents, light is metered by photocells, pressure, temperature, wetness, chemical impurities, almost anything anyone wants to measure can be evaluated electrically. The cathode ray tube can combine one, two, or three such indications and make them visible. Special circuits can be used to make the light spot move from left to right across the tube at a constant velocity, then snap back to the starting point instantaneously, while a "blanking circuit" blocks the CRT grid so that the return trace doesn't appear. Now if a varying voltage is fed into the vertical deflecting plates, the path of the spot of light—the spot where the beam of electrons from the electron gun impinges on the fluorescent screen—will visibly and very accurately plot a graph of the variation of the input voltage against time.

If the horizontal deflection is controlled by a device which is constantly shifting the transmitting frequency of a signal generator, while the vertical deflection is proportional to the output voltage of a radio set tuned to that frequency, the CRT will plot out, with an infinite number of plot-points, a graph representing frequency-vs-response for that receiver—a graph which shows how sharply or broadly that set tunes. A short-wave code receiver is best when it has a very sharply peaked response, extremely sharp-tuning—but a high-fidelity broadcast receiver should have a good, broad curve of response, so that it will pick up high and low notes both, yet the curve should drop sharply on each side of the peaks, to avoid picking up two stations at once. Aligning a set that way is simple—when you can *see* what happens to the response as you vary the tuning!

A CRT will plot a graphical picture of any two or three quantities which can be evaluated electrically —and such graphical analyses can be used in tens of thousands of ways we haven't begun to apply. Television is a side line. But you can make a cathode ray tube plot, instantaneously, a curve of percentage - reflection - vs - light - color—a curve which is a precise and definitive expression of the color of an object. Any object of that color will produce a curve of exactly the same shape. If you set up such a system, and paste a piece of opaque tape across the face of the tube so

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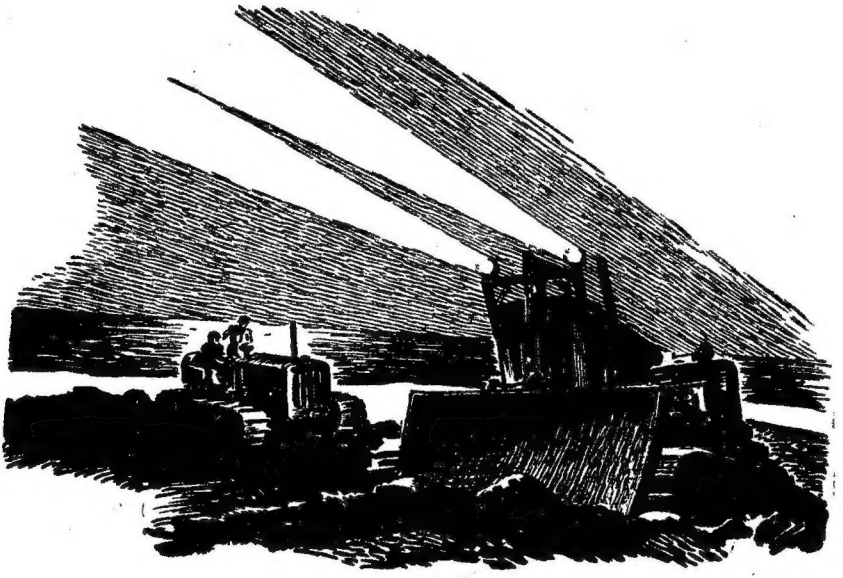


Killdozer!

by THEODORE STURGEON

***Sturgeon's** been missing for a long time now; he's been doing heavy construction work. This yarn he got out of that experience: it will, certainly, be long remembered.*

Illustrated by Orban

Before the race was the deluge, and before the deluge another race, whose nature it is not for mankind to understand. Not unearthly, not alien, for this was their earth and their home.

There was a war between this race, which was a great one, and another. The other was truly alien, a sentient cloudform, an intelligent grouping of tangible electrons. It was spawned in mighty machines by some accident of a science before our aboriginal conception in its complexities. And the machines, servants of the people, became the peo-

ple's masters, and great were the battles that followed. The electron-beings had the power to warp the delicate balances of atom-structure, and their life-medium was metal, which they permeated and used to their own ends. Each weapon the people developed was possessed and turned against them, until a time when the remnants of that vast civilization found a defense—

An insulator. The terminal product or by-product of all energy research—neutronium.

In its shelter they developed a weapon. What it was we shall never know, and our race will live—or we shall know, and our race will perish as theirs perished. For, to destroy the enemy, it got out of hand and its measureless power destroyed them with it, and their cities, and their possessed machines. The very earth dissolved in flame, the crust writhed and shook and the oceans boiled. Nothing escaped it, nothing that we know as life, and nothing of the pseudolife that had evolved within the mysterious force-fields of their incomprehensible machines, save one hardy mutant.

Mutant it was, and ironically this one alone could have been killed by the first simple measures used against its kind—but it was past time for simple expediences. It was an organized electron-field possessing intelligence and mobility and a will to destroy, and little else. Stunned by the holocaust, it drifted over the grumbling globe, and in a lull in the violence of the forces gone wild on Earth, sank to the steaming ground in its half-conscious exhaustion. There it found shelter—shelter built by and for its dead enemies. An envelope of neutronium. It drifted in, and its consciousness at last fell to its lowest ebb. And there it lay while the neutronium, with its strange constant flux, its interminable striving for perfect balance, extended itself and closed the opening. And thereafter in the turbulent eons that followed, the envelope tossed like a gray bubble on the surface of the roiling sphere, for no substance on Earth would have it or combine with it.

The ages came and went, and chemical action and reaction did their mysterious work, and once again there was life and evolution. And a tribe found the mass of neutronium, which is not a substance but a static force, and were awed by its aura of indescribable chill, and they worshiped it and built a temple around it and made sacrifices to it. And ice and fire and the seas came and went, and the land rose and fell as the years went by, until the ruined temple was on a knoll, and the knoll was an island. Islanders came and went, lived and built and died, and races forgot. So now, somewhere in the Pacific to the west of the archipelago called Islas Revillagigeda, there was uninhabited island. And one day—

Chub Horton and Tom Jaeger stood watching the *Sprite* and her squat tow of three cargo lighters dwindle over the glassy sea. The big ocean-going towboat and her charges seemed to be moving out

of focus rather than traveling away. Chub spat cleanly around the cigar that grew out of the corner of his mouth.

"That's that for three weeks. How's it feel to be a guinea pig?"

"We'll get it done." Tom had little crinkles all around the outer ends of his eyes. He was a head taller than Chub and rangy, and not so tough, and he was a real operator. Choosing him as a foreman for the experiment had been wise, for he was competent and he commanded respect. The theory of airfield construction that they were testing appealed vastly to him, for here were no officers-in-charge, no government inspectors, no time-keeping or reports. The government had allowed the company a temporary land grant, and the idea was to put production-line techniques into the layout and grading of the project. There were six operators and two mechanics and more than a million dollars worth of the best equipment that money could buy. Government acceptance was to be on a partially completed basis, and contingent on government standards. The theory obviated both gold-bricking and graft, and neatly sidestepped the manpower shortage. "When that blacktopping crew gets here, I reckon we'll be ready for 'em," said Tom.

He turned and scanned the island with an operator's vision and saw it as it was, and in all the stages it would pass through, and as it would look when they had finished, with four thousand feet of clean-draining runway, hard-packed shoulders, four acres of plane-park, the access road and the short taxiway. He saw the lay of each lift that the power shovel would cut as it brought down the marl bluff, and the ruins on top of it that would give them stone to haul down the salt-flat to the little swamp at the other end, there to be walked in by the dozers.

"We got time to walk the shovel up there to the bluff before dark."

They walked down the beach toward the outcropping where the equipment stood surrounded by crates and drums of supplies. The three tractors were ticking over quietly, the two-cycle Diesel chuckling through their mufflers and the big D-7 whacking away its metronomic compression knock on every easy revolution. The Dumptors were lined up and silent, for they would not be ready to work until the shovel was ready to load them. They looked like a mechanical interpretation of Dr. Doolittle's "Pushme-pullyou," the fantastic animal with two front ends. They had two large driving wheels and two small steerable wheels. The motor and the driver's seat were side by side over the front—or smaller—wheels; but the driver faced the dump body between the big rear wheels, exactly the opposite of the way he would sit in a dump truck. Hence, in traveling from shovel to dumping-ground, the operator drove backwards, looking over his shoulder, and in dumping he backed the machine up but he himself traveled forward—quite a trick for fourteen hours a day!

The shovel squatted in the midst of all the others, its great hulk looming over them, humped there with its boom low and its iron chin on the ground, like some great tired dinosaur.

Rivera, the Puerto Rican mechanic, looked up grinning as Tom and Chub approached, and stuck a bleeder wrench into the top pocket of his coveralls.

"She says 'Sigalo'" he said, his white teeth flashlighting out of the smear of grease across his mouth. "She says she wan' to get dirt on dis paint," he kicked the blade of the Seven with his heel.

Tom sent the grin back—always a surprising thing in his grave face.

"That Seven'll do that, and she'll take a good deal off her bitin' edge along with the paint before we're through. Get in the saddle, Goony. Build a ramp off the rocks down to the flat there, and blade us off some humps from here to the bluff yonder. We're walking the dipper up there."

The Puerto Rican was in the seat before Tom had finished, and with a roar the Seven spun in its length and moved back along the outcropping to the inland edge. Rivera dropped his blade and the sandy marl curled and piled up in front of the dozer, loading the blade and running off in two even rolls at the ends. He shoved the load toward the rocky edge, the Seven revving down as it took the load, *blat blat blatting* and pulling like a supercharged ox as it fired slowly enough for them to count the revolutions.

"She's a hunk of machine," said Tom.

"A hunk of operator, too," gruffed Chub, and added, "for a mechanic."

"The boy's all right," said Kelly. He was standing there with them, watching the Puerto Rican operate the dozer, as if he had been there all along, which was the way Kelly always arrived places. He was tall, slim, with green eyes too long and an easy stretch to the way he moved, like an attenuated cat. He said, "Never thought I'd see the day when equipment was shipped set up ready to run like this. Guess no one ever thought of it before."

"There's times when heavy equipment has to be unloaded in a hurry these days," Tom said. "If they can do it with tanks, they can do it with construction equipment. We're doin' it to build something instead, is all. Kelly, crank up the shovel. It's oiled. We're walking it over to the bluff."

Kelly swung up into the cab of the big dipper-stick and, diddling the governor control, pulled up the starting handle. The Murphy Diesel snorted and settled down into a thudding idle. Kelly got into the saddle, set up the throttle a little, and began to boom up.

"I still can't get over it," said Chub. "Not more'n a year ago we'd a had two hundred men on a job like this."

Tom smiled. "Yeah, and the first thing we'd have done would be to build an office building, and then

quarters. Me, I'll take this way. No timekeepers, no equipment use reports, no progress and yardage summaries, no nothin' but eight men, a million bucks worth of equipment, an' three weeks. A shovel an' a mess of tool crates'll keep the rain off us, an' army field rations'll keep our bellies full. We'll get it done, we'll get out and we'll get paid."

Rivera finished the ramp, turned the Seven around and climbed it, walking the new fill down. At the top he dropped his blade, floated it, and backed down the ramp, smoothing out the rolls. At a wave from Tom he started out across the shore, angling up toward the bluff, beating out the humps and carrying fill into the hollows. As he worked, he sang, feeling the beat of the mighty motor, the micrometric obedience of that vast implacable machine.

"Why doesn't that monkey stick to his grease guns?"

Tom turned and took the chewed end of a match stick out of his mouth. He said nothing, because he had for some time been trying to make a habit of saying nothing to Joe Dennis. Dennis was an ex-accountant, drafted out of an office at the last gasp of a defunct project in the West Indies. He had become an operator because they needed operators badly. He had been released with alacrity from the office because of his propensity for small office politics. It was a game he still played, and completely aside from his boiled-looking red face and his slightly womanish walk, he was out of place in the field; for boot-licking and back-stabbing accomplish even less out on the field than they do in an office. Tom, trying so hard to keep his mind on his work, had to admit to himself that of all Dennis' annoying traits the worst was that he was as good a pan operator as could be found anywhere, and no one could deny it.

Dennis certainly didn't.

"I've seen the day when anyone catching one of those goonies so much as sitting on a machine during lunch, would kick his fanny," Dennis groused. "Now they give 'em a man's work and a man's pay."

"*Doin'* a man's work, ain't he?" Tom said.

"He's a Puerto Rican!"

Tom turned and looked at him levelly. "Where was it you said *you* come from," he mused. "Oh yeah. Georgia."

"What do you mean by that?"

Tom was already striding away. "Tell you as soon as I have to," he flung back over his shoulder. Dennis went back to watching the Seven.

Tom glanced at the ramp and then waved Kelly on. Kelly set his housebrake so the shovel could not swing, put her into travel gear, and shoved the swing lever forward. With a crackling of drive chains and a massive scrunching of compacting coral sand, the shovel's great flat pads carried her over and down the ramp. As she tipped over the peak of the ramp the heavy manganese steel bucket-door gaped open and closed, like a hungry mouth, slamming up against the bucket until suddenly it

latched shut and was quiet. The big Murphy Diesel crooned hollowly under compression as the machine ran downgrade and then the sensitive governor took hold and it took up its belly-beating thud.

Peebles was standing by one of the door-pan combines, sucking on his pipe and looking out to sea. He was grizzled and heavy, and from under the bushiest gray brows looked the calmest gray eyes Tom had ever seen. Peebles had never gotten angry at a machine—a rare trait in a born mechanic—and in fifty-odd years he had learned it was even less use getting angry at a man. Because no matter what, you could always fix what was wrong with a machine. He said around his pipestem,

"Hope you'll give me back my boy, there."

Tom's lips quirked in a little grin. There had been an understanding between old Peebles and himself ever since they had met. It was one of those things which exists unspoken—they knew little about each other because they had never found it necessary to make small talk to keep their friendship extant. It was enough to know that each could expect the best from the other, without persuasion.

"Rivera?" Tom asked. "I'll chase him back as soon as he finishes that service road for the dipper-stick. Why—got anything on?"

"Not much. Want to get that arc welder drained and flushed and set up a grounded table in case you guys tear anything up." He paused. "Besides, the kid's filling his head up with too many things at once. Mechanicing is one thing; operating is something else."

"Hasn't got in his way much so far, has it?"

"Nope. Don't aim t' let it, either. 'Less you need him."

Tom swung up on the pan tractor. "I don't need him that bad, Peeby. If you want some help in the meantime, get Dennis."

Peebles said nothing. He spat. He didn't say anything at all.

"What's the matter with Dennis?" Tom wanted to know.

"Look yonder," said Peebles, waving his pipestem. Out on the beach Dennis was talking to Chub, in Dennis' indefatigable style, standing beside Chub, one hand on Chub's shoulder. As they watched they saw Dennis call his side-kick, Al Knowles.

"Dennis talks too much," said Peebles. "That most generally don't amount to much, but that Dennis, he sometimes *says* too much. Ain't got what it takes to run a show, and knows it. Makes up for it by messin' in between folks."

"He's harmless," said Tom.

Still looking up the beach, Peebles said slowly,

"Is, so far."

Tom started to say something, then shrugged. "I'll send you Rivera," he said, and opened the throttle. Like a huge electric dynamo, the two-cycle motor whined to a crescendo. Tom lifted the dozer with a small lever by his right thigh and raised the pan with the long control sprouting out from behind his shoulder. He moved off,

setting the rear gate of the scraper so that anything the blade bit would run off to the side instead of loading into the pan. He slapped the tractor into sixth gear and whined up to and around the crawling shovel, cutting neatly in under the boom and running on ahead with his scraper blade just touching the ground, dragging to a fine grade the service road Rivera had cut.

Dennis was saying, "It's that little Hitler stuff. Why should I take that kind of talk? 'You come from Georgia,' he says. What is he—a Yankee or something?"

"A crackah f'm Macon," chortled Al Knowles, who came from Georgia, too. He was tall and stringy and round-shouldered. All of his skill was in his hands and feet, brains being a commodity he had lived without all his life until he had met Dennis and used him as a reasonable facsimile thereof.

"Tom, didn' mean nothing by it," said Chub.

"No, he didn't mean nothin'. Only that we do what he says the way he says it, specially if he finds a way we don't like it. *You* wouldn't do like that, Chub. Al, think Chub would carry on thataway?"

"Sure wouldn't," said Al, feeling it expected of him.

"Nuts," said Chub, pleased and uncomfortable, and thinking, what have I got against Tom?—not knowing, not liking Tom as well as he had. "Tom's the man here, Dennis. We got a job to do—let's skit and git. Man can take anything for a lousy six weeks."

"Oh, sho'," said Al.

"Man can take just so much," Dennis said. "What they put a man like that on top for, Chub? What's the matter with you? Don't you know grading and drainage as good as Tom? Can Tom stake out a side hill like you can?"

"Sure, sure, but what's the difference, long as we get a field built? An' anyhow, hell with bein' the boss-man. Who gets the blame if things don't run right, anyway?"

Dennis stepped back, taking his hand off Chub's shoulder, and stuck an elbow in Al's ribs.

"You see that, Al? Now there's a smart man. That's the thing Uncle Tom didn't bargain for. Chub, you can count on Al and me to do just that little thing."

"Do just what little thing?" asked Chub, genuinely puzzled.

"Like you said. If the job goes wrong, the boss gets blamed. So if the boss don't behave, the job goes wrong."

"Uh-huh," agreed Al with the conviction of mental simplicity.

Chub double-took this extraordinary logical process and grasped wildly at anger as the conversation slid out from under him. "I didn't say any such thing! This job is goin' to get done, no matter what! Hitler ain't hangin' no iron cross on me or anybody else around here if I can help it."

"Tha's the ol' fight," feinted Dennis. "We'll show that guy what we think of his kind of sabotage."

"You talk too much," said Chub and escaped with the remnants of coherence. Every time he talked

with Dennis he walked away feeling as if he had an unwanted membership card stuck in his pocket that he couldn't throw away with a clear conscience.

Rivera ran his road up under the bluff, swung the Seven around, punched out the master clutch and throttled down, idling. Tom was making his pass with the pan, and as he approached, Rivera slipped out of the seat and behind the tractor, laying a sensitive hand on the final drive casing and sprocket bushings, checking for overheating. Tom pulled alongside and beckoned him up on the pan tractor.

"Que pase, Goony? Anything wrong?"

Rivera shook his head and grinned. "Nothing wrong. She is perfect, that *'De Siete.'* She—"

"That what? 'Daisy Etta'?"

"De siete. In Spanish, D-7. It mean something in English?"

"Got you wrong," smiled Tom. "But Daisy Etta is a girl's name in English, all the same."

He shifted the pan tractor into neutral and engaged the clutch, and jumped off the machine. Rivera followed. They climbed aboard the Seven, Tom at the controls.

Rivera said "Daisy Etta," and grinned so widely that a soft little chuckling noise came from behind his back teeth. He reached out his hand, crooked his little finger around one of the tall steering clutch levers, and pulled it all the way back. Tom laughed outright.

"You got something there," he said. "The easiest runnin' cat ever built. Hydraulic steerin' clutches and brakes that'll bring you to a dead stop if you spit on 'em. Forward an' reverse lever so's you got all your speeds front and backwards. A little different from the old jobs. They had no booster springs, eighten years ago; took a sixty-pound pull to get a steerin' clutch back. Cuttin' a side-hill with an angle-dozer really was a job in them days. You try it sometime, dozin' with one hand, holdin' her nose out o' the bank with the other, ten hours a day. And what'd it get you? Eighty cents an hour an' "—Tom took his cigarette and butted the fiery end out against the horny palm of his hand—"these."

"Santa Maria!"

"Want to talk to you, Goony. Want to look over the bluff, too, at that stone up there. It'll take Kelly pret' near an hour to get this far and sumped in, anyhow."

They started up the slope, Tom feeling the ground under the four-foot brush, taking her up in a zig-zag course like a hairpin road on a mountainside. Though the Seven carried a muffler on the exhaust stack that stuck up out of the hood before them, the blat of four big cylinders hauling fourteen tons of steel upgrade could outshout any man's conversation, so they sat without talking, Tom driving, Rivera watching his hands flick over the controls.

The bluff started in a low ridge running almost the length of the little island, like a lopsided backbone. Toward the center it rose

abruptly, sent a wing out toward the rocky outcropping at the beach where their equipment had been unloaded, and then rose again to a small, almost square plateau area, half a mile square. It was humpy and rough until they could see all of it, when they realized how incredibly level it was, under the brush and ruins that covered it. In the center—and exactly in the center they realized suddenly—was a low, overgrown mound. Tom threw out the clutch and revved her down.

"Survey report said there was stone up here," Tom said, vaulting out of the seat. "Let's walk around some."

They walked toward the knoll, Tom's eyes casting about as he went. He stooped down into the heavy, short grass and scooped up a piece of stone, blue-gray, hard and brittle.

"Rivera—look at this. This is what the report was talking about. See—more of it. All in small pieces, though. We need big stuff for the bog if we can get it."

"Good stone?" asked Rivera.

"Yes, boy—but it don't belong here. Th' whole island's sand and marl and sandstone on the outcrop down yonder. This here's a bluestone, like diamond clay. Harder'n blazes. I never saw this stuff on a marl hill before. Or near one. Anyhow, root around and see if there is any big stuff."

They walked on. Rivera suddenly dipped down and pulled grass aside.

"Tom—here's a beeg one."

Tom came over and looked down at the corner of stone sticking up out of the topsoil. "Yeh. Goony, get your girl-friend over her and we'll root it out."

Rivera sprinted back to the idling dozer and climbed aboard. He brought the machine over to where Tom waited, stopped, stood up and peered over the front of the machine to locate the stone, then sat down and shifted gears. Before he could move the machine Tom was on the fender beside him, checking him with a hand on his arm.

"No, boy—no. Not third. First. And half throttle. That's it. Don't try to bash a rock out of the ground. Go on up to it easy; set your blade against it, lift it out, don't boot it out. Take it with the middle of your blade, not the corner—get the load on both hydraulic cylinders. Who told you to do like that?"

"No one tol' me, Tom. I see a man do it, I do it."

"Yeah? Who was it?"

"Dennis, but—"

"Listen, Goony, if you want to learn anything from Dennis, watch him while he's on a pan. He dozes like he talks. That reminds me—what I wanted to talk to you about. You ever have any trouble with him?"

Rivera spread his hands. "How I have trouble when he never talk to me?"

"Well, that's all right then. You keep it that way. Dennis is O.K., I guess, but you better keep away from him."

He went on to tell the boy then about what Peebles had said concerning being an operator and a mechanic at the same time. Rivera's

lean dark face fell, and his hand strayed to the blade control, touching it lightly, feeling the composition grip and the machined locknuts that held it. When Tom had quite finished he said,

"O.K., Tom—if you want, you break 'em, I feex 'em. But if you wan' help some time, I run *Daisy Etta* for you, no?"

"Sure kid, sure. But don't forget, no man can do everything."

"You can do everything," said the boy.

Tom leaped off the machine and Rivera shifted into first and crept up to the stone, setting the blade gently against it. Taking the load, the mighty engine audibly bunched its muscles; Rivera opened the throttle a little and the machine set solidly against the stone, the tracks slipping, digging into the ground, piling loose earth up behind. Tom raised a fist, thumb up, and the boy began lifting his blade. The Seven lowered her snout like an ox pulling through mud; the front of the tracks buried themselves deeper and the blade slipped upward an inch on the rock, as if it were on a ratchet. The stone shifted, and suddenly heaved itself up out of the earth that covered it, bulging the sod aside like a ship's slow bow-wave. And the blade lost its grip and slipped over the stone. Rivera slapped out the master clutch within an ace of letting the mass of it poke through his radiator core. Reversing, he set the blade against it again and rolled it at last into daylight.

Tom stood staring at it, scratching the back of his neck. Rivera got off the machine and stood beside him. For a long time they said nothing.

The stone was roughly rectangular, shaped like a brick with one end cut at about a thirty-degree angle. And on the angled face was a square-cut ridge, like the tongue on a piece of milled lumber. The stone was about 3 x 2 x 2 feet, and must have weighed six or seven hundred pounds.

"Now that," said Tom, bug-eyed, "didn't grow *here,* and if it did it never grew that way."

"Una piedra de una casa," said Rivera softly. "Tom, there was a building here, no?"

Tom turned suddenly to look at the knoll.

"There is a building here—or what's left of it. Lord on'y knows how old—"

They stood there in the slowly dwindling light, staring at the knoll; and there came upon them a feeling of oppression, as if there were no wind and no sound anywhere. And yet there was wind, and behind them *Daisy Etta* whacked away with her muttering idle, and nothing had changed and—was that it? That nothing had changed? That nothing would change, or could, here?

Tom opened his mouth twice to speak, and couldn't, or didn't want to, he didn't know which. Rivera slumped down suddenly on his hunkers, back erect, and his eyes wide.

It grew very cold. "It's cold," Tom said, and his voice sounded

harsh to him. And the wind blew warm on them, the earth was warm under Rivera's knees. The cold was not a lack of heat, but a lack of something else—warmth, but the specific warmth of life-force, perhaps. The feeling of oppression grew, as if their recognition of the strangeness of the place had started it, and their increasing sensitivity to it made it grow.

Rivera said something, quietly, in Spanish.

"What are you looking at?" asked Tom.

Rivera started violently, threw up an arm, as if to ward off the crash of Tom's voice.

"I . . . there is nothin' to see, Tom. I feel this way wance before. I dunno—" He shook his head, his eyes wide and blank. "An' after, there was being wan hell of a thunderstorm—" His voice petered out.

Tom took his shoulder and hauled him roughly to his feet. "Goony! You slap-happy?"

The boy smiled, almost gently. The down on his upper lip held little spheres of sweat. "I ain' nothin', Tom; I'm jus' scare like hell."

"You scare yourself right back up there on that cat and git to work," Tom roared. More quietly then, he said, "I know there's something—wrong—here, Goony, but that ain't goin' to get us a runway built. Anyhow, I know what to do about a dawg 'at gits gunshy. Ought to be able to do as much fer you. Git along to th' mound now and see if it ain't a cache o' big stone for us. We got a swamp down there to fill."

Rivera hesitated, started to speak, swallowed and then walked slowly over to the Seven. Tom stood watching him, closing his mind to the impalpable pressure of something, somewhere near, making his guts cold.

The bulldozer nosed over to the mound, grunting, reminding Tom suddenly that the machine's Spanish slang name was *puerco*—pig, boar. Rivera angled into the edge of the mound with the cutting corner of the blade. Dirt and brush curled up, fell away from the mound and loaded from the bank side, out along the moldboard. The boy finished his pass along the mound, carried the load past it and wasted it out on the flat, turned around and started back again.

Ten minutes later Rivera struck stone, the manganese steel screaming along it, a puff of gray dust spouting from the cutting corner. Tom knelt and examined it after the machine had passed. It was the same kind of stone they had found out on the flat—and shaped the same way. But here it was a wall, the angled faces of the block ends obviously tongued and grooved together.

Cold, cold as—

Tom took one deep breath and wiped sweat out of his eyes.

"I don't care," he whispered, "I got to have that stone. I got to fill me a swamp." He stood back and motioned to Rivera to blade into a chipped crevice in the buried wall.

The Seven swung into the wall and stopped while Rivera shifted into first, throttled down and lowered his blade. Tom looked up into his face. The boy's lips were white. He eased in the master clutch, the blade dipped and the corner swung neatly into the crevice.

The dozer blatted protestingly and began to crab sideways, pivoting on the end of the blade. Tom jumped out of the way, ran around behind the machine, which was almost parallel with the wall now, and stood in the clear, one hand raised ready to signal, his eyes on the straining blade. And then everything happened at once.

With a toothy snap the block started and came free, pivoting outward from its square end, bringing with it its neighbor. The block above them dropped, and the whole mound seemed to settle. And *something* whooshed out of the black hole where the rocks had been. Something like a fog, but not a fog that could be seen, something huge that could not be measured. With it came a gust of that cold which was not cold, and the smell of ozone, and the prickling crackle of a mighty static discharge.

Tom was fifty feet from the wall before he knew he had moved. He stopped and saw the Seven suddenly buck like a wild stallion, once, and Rivera turning over twice in the air. Tom shouted some meaningless syllable and tore over to the boy, where he sprawled in the rough grass, lifted him in his arms, and ran. Only then did he realize that he was running from the machine.

It was like a mad thing. Its moldboard rose and fell. It curved away from the mound, howling governor gone wild, controls flailing. The blade dug repeatedly into the earth, gouging it up in great dips through which the tractor plunged, clanking and bellowing furiously. It raced away in a great irregular arc, turned and came snorting back to the mound, where it beat at the buried wall, slewed and scraped and roared.

Tom reached the edge of the plateau sobbing for breath, and kneeling, laid the boy gently down on the grass.

"Goony, boy . . . hey—"

The long silken eyelashes fluttered, lifted. Something wrenched in Tom as he saw the eyes, rolled right back so that only the whites showed. Rivera drew a long quivering breath which caught suddenly. He coughed twice, threw his head from side to side so violently that Tom took it between his hands and steadied it.

"Ay . . . Maria madre . . . que me pasado, Tom—w'at has happen to me?"

"Fell off the Seven, stupid. You . . . how you feel?"

Rivera scrabbled at the ground, got his elbows half under him, then sank back weakly. "Feel O.K. Headache like hell. W-w'at happen to my feets?"

"Feet? They hurt?"

"No hurt—" The young face went gray, the lips tightened with effort. "No nothin', Tom."

"You can't move 'em?"

Rivera shook his head, still try-

ing. Tom stood up. "You take it easy. I'll go get Kelly. Be right back."

He walked away quickly and when Rivera called to him he did not turn around. Tom had seen a man with a broken back before.

At the edge of the little plateau Tom stopped, listening. In the deepening twilight he could see the bulldozer standing by the mound. The motor was running; she had not stalled herself. But what stopped Tom was that she wasn't idling, but revving up and down as if an impatient hand were on the throttle—*hroom hroooom,* running up and up far faster than even a broken governor should permit, then coasting down to near silence, broken by the explosive punctuation of sharp and irregular firing. Then it would run up and up again, almost screaming, sustaining a r.p.m. that threatened every moving part, shaking the great machine like some deadly ague.

Tom walked swiftly toward the Seven, a puzzled and grim frown on his weather-beaten face. Governors break down occasionally, and once in a while you will have a motor tear itself to pieces, revving up out of control. But it will either do that or it will rev down and quit. If an operator is fool enough to leave his machine with the master clutch engaged, the machine will take off and run the way the Seven had—but it will not turn unless the blade corner catches in something unresisting, and then the chances are very strong that it will stall. But in any case, it was past reason for any machine to act this way, revving up and down, running, turning, lifting and dropping the blade.

The motor slowed as he approached, and at last settled down into something like a steady and regular idle. Tom had the sudden crazy impression that it was watching him. He shrugged off the feeling, walked up and laid a hand on the fender.

The Seven reacted like a wild stallion. The big Diesel roared, and Tom distinctly saw the master clutch lever snap back over center. He leaped clear, expecting the machine to jolt forward, but apparently it was in a reverse gear, for it shot backwards, one track locked, and the near end of the blade swung in a swift vicious arc, breezing a bare fraction of an inch past his hip as he danced back out of the way.

And as if it had bounced off a wall, the tractor had shifted and was bearing down on him, the twelve-foot blade rising, the two big headlights looming over him on their bow-legged supports, looking like the protruding eyes of some mighty toad. Tom had no choice but to leap straight up and grasp the top of the blade in his two hands, leaning back hard to brace his feet against the curved moldboard. The blade dropped and sank into the soft topsoil, digging a deep little swale in the ground. The earth loading on the moldboard rose and churned around Tom's legs; he stepped wildly, keeping them clear of the rolling drag of it. Up came the

blade then, leaving a four-foot pile at the edge of the pit; down and up the tractor raced as the tracks went into it; up and up as they climbed the pile of dirt. A quick balance and overbalance as the machine lurched up and over like a motorcycle taking a jump off a ramp, and then a spine-shaking crash as fourteen tons of metal smashed blade-first into the ground.

Part of the leather from Tom's tough palms stayed with the blade as he was flung off. He went head over heels backwards, but had his feet gathered and sprang as they touched the ground; for he knew that no machine could bury its blade like that and get out easily. He leaped to the top of the blade, got one hand on the radiator cap, vaulted. Perversely, the cap broke from its hinge and came away in his hand, in that split instant when only that hand rested on anything. Off balance, he landed on his shoulder with his legs flailing the air, his body sliding off the hood's smooth shoulder toward the track now churning the earth beneath. He made a wild grab at the air intake pipe, barely had it in his fingers when the dozer freed itself and shot backwards up and over the hump. Again that breathless flight pivoting over the top, and the clanking crash as the machine landed, this time almost flat on its tracks.

The jolt tore Tom's hand away, and as he slid back over the hood the crook of his elbow caught the exhaust stack, the dull red metal biting into his flesh. He grunted and clamped the arm around it. His momentum carried him around it, and his feet crashed into the steering clutch levers. Hooking one with his instep, he doubled his legs and whipped himself back, scrabbling at the smooth warm metal, crawling frantically backwards until he finally fell heavily into the seat.

"Now," he gritted through a red wall of pain, "you're gonna git operated." And he kicked out the master clutch.

The motor wailed, with the load taken off so suddenly. Tom grasped the throttle, his thumb clamped down on the ratchet release, and he shoved the lever forward to shut off the fuel.

It wouldn't shut off; it went down to a slow idle, but it wouldn't shut off.

"There's one thing you can't do without," he muttered, "compression."

He stood up and leaned around the dash, reaching for the compression-release lever. As he came up out of the seat, the engine revved up again. He turned to the throttle, which had snapped back into the "open" position. As his hand touched it the master clutch lever snapped in and the howling machine lurched forward with a jerk that snapped his head on his shoulders and threw him heavily back into the seat. He snatched at the hydraulic blade control and threw it to "float" position: and then as the falling moldboard touched the ground, into "power down." The cutting edge bit into the ground and the engine began to

labor. Holding the blade control, he pushed the throttle forward with his other hand. One of the steering clutch levers whipped back and struck him agonizingly on the kneecap. He involuntarily let go of the blade control and the moldboard began to rise. The engine began to turn faster and he realized that it was not responding to the throttle. Cursing, he leaped to his feet; the suddenly flailing steering clutch levers struck him three times in the groin before he could get between them.

Blind with pain, Tom clung gasping to the dash. The oil-pressure gauge fell off the dash to his right, with a tingling of broken glass, and from its broken quarter-inch line scalding oil drenched him. The shock of it snapped back his wavering consciousness. Ignoring the blows of the left steering clutch and the master clutch which had started the same mad punching, he bent over the left end of the dash and grasped the compression lever. The tractor rushed forward and spun sickeningly, and Tom knew he was thrown. But as he felt himself leave the decking his hand punched the compression lever down. The great valves at the cylinder heads opened and locked open; atomized fuel and superheated air chattered out, and as Tom's head and shoulders struck the ground the great wild machine rolled to a stop, stood silently except for the grumble of water boiling in the cooling system.

Minutes later Tom raised his head and groaned. He rolled over and sat up, his chin on his knees, washed by wave after wave of pain. As they gradually subsided, he crawled to the machine and pulled himself to his feet, hand over hand on the track. And groggily he began to cripple the tractor, at least for the night.

He opened the cock under the fuel tank, left the warm yellow fluid gushing out on the ground. He opened the drain on the reservoir by the injection pump. He found a piece of wire in the crank box and with it tied down the compression release lever. He crawled up on the machine, wrenched the hood and ball jar off the air intake precleaner, pulled off his shirt and stuffed it down the pipe. He pushed the throttle all the way forward and locked it with the locking pin. And he shut off the fuel on the main line from the tank to the pump.

Then he climbed heavily to the ground and slogged back to the edge of the plateau where he had left Rivera.

They didn't know Tom was hurt until an hour and a half later—there had been too much to do—rigging a stretcher for the Puerto Rican, building him a shelter, an engine crate with an Army pup tent for a roof. They brought out the first-aid kit and the medical books and did what they could—tied and splinted and dosed with an opiate. Tom was a mass of bruises, and his right arm, where it had hooked the exhaust stack, was a flayed mass. They fixed him up then, old Peebles handling the sulfa powder and

bandages like a trained nurse. And only then was there talk.

"I've seen a man thrown off a pan," said Dennis, as they sat around the coffee urn munching C rations. "Sittin' up on the arm rest on a cat, looking backwards. Cat hit a rock and bucked. Threw him off on the track. Stretched him out ten feet long." He in-whistled some coffee to dilute the mouthful of food he had been talking around, and masticated noisily. "Man's a fool to set up there on one side of his butt even on a pan. Can't see why th' goony was doin' it on a dozer."

"He wasn't," said Tom.

Kelly rubbed his pointed jaw. "He set flat on th' seat an' was th'owed?"

"That's right."

After an unbelieving silence Dennis said, "What was he doin'—drivin' over sixty?"

Tom looked around the circle of faces lit up by the over-artificial brilliance of a pressure lantern, and wondered what the reaction would be if he told it all just as it was. He had to say something, and it didn't look as if it could be the truth.

"He was workin'," he said finally. "Bucking stone out of the wall of an old building up on the mesa there. One turned loose an' as it did the governor must've gone haywire. She bucked like a loco hoss and run off."

"Run off?"

Tom opened his mouth and closed it again, and just nodded.

Dennis said, "Well, reckon that's what happens when you put a mechanic to operatin'."

"That had nothin' to do with it," Tom snapped.

Peebles spoke up quickly. "Tom—what about the Seven? Broke up any?"

"Some," said Tom. "Better look at the steering clutches. An' she was hot."

"Head's cracked," said Harris, a burly young man with shoulders like a buffalo and a famous thirst.

"How do you know?"

"Saw it when Al and me went up with the stretcher to get the kid while you all were building the shelter. Hot water runnin' down the side of the block."

"You mean you walked all the way out to the mound to look at that tractor while the kid was lyin' there? I told you where he was!"

"Out to the mound!" Al Knowles' pop eyes teetered out of their sockets. "We found that cat stalled twenty feet away from where the kid was!"

"What!"

"That's right, Tom," said Harris. "What's eatin' you? Where'd you leave it?"

"I told you . . . by the mound . . . the ol' building we cut into."

"Leave the startin' motor runnin'?"

"Starting motor?" Tom's mind caught the picture of the small, two-cylinder gasoline engine bolted to the side of the big Diesel's crankcase, coupled through a Bendix gear and clutch to the flywheel of the Diesel to crank it. He remembered his last glance at the still machine, silent but for the sound of water boiling. "Hell no!"

Al and Harris exchanged a glance. "I guess you were sort of slap-happy at the time, Tom," Harris said, not unkindly. "When we were halfway up the hill we heard it, and you know you can't mistake that racket. Sounded like it was under a load."

Tom beat softly at his temples with his clenched fists. "I left that machine dead," he said quietly. "I got compression off her and tied down the lever. I even stuffed my shirt in the intake. I drained the tank. But—I didn't touch the starting motor."

Peebles wanted to know why he had gone to all that trouble. Tom just looked vaguely at him and shook his head. "I shoulda pulled the wires. I never thought about the starting motor," he whispered. Then, "Harris—you say you found the starting motor running when you got to the top?"

"No—she was stalled. And hot—awmighty hot. I'd say the startin' motor was seized up tight. That must be it, Tom. You left the startin' motor runnin' and somehow engaged the clutch an' Bendix." His voice lost conviction as he said it—it takes seventeen separate motions to start a tractor of this type. "Anyhow, she was in gear an' crawled along on the little motor."

"I done that once," said Chub. "Broke a con rod on an Eight, on a highway job. Walked her about three-quarters of a mile on the startin' motor that way. Only I had to stop every hundred yards and let her cool down some."

Not without sarcasm, Dennis said, "Seems to me like the Seven was out to get th' goony. Made one pass at him and then went back to finish the job."

Al Knowles haw-hawed extravagantly.

Tom stood up, shaking his head, and went off among the crates to the hospital they had jury-rigged for the kid.

A dim light was burning inside, and Rivera lay very still, with his eyes closed. Tom leaned in the doorway—the open end of the engine crate, and watched him for a moment. Behind him he could hear the murmur of the crew's voices; the night was otherwise windless and still. Rivera's face was the peculiar color that olive skin takes when drained of blood. Tom looked at his chest and for a panicky moment thought he could discern no movement there. He entered and put a hand over the boy's heart. Rivera shivered, his eyes flew open, and he drew a sudden breath which caught raggedly at the back of his throat. "Tom . . . Tom!" he cried weakly.

"O. K., Goony . . . *que pase?*"

"She comeen back . . . Tom!"

"Who?"

"El de siete."

Daisy Etta—"She ain't comin' back, kiddo. You're off the mesa now. Keep your chin up, fella."

Rivera's dark, doped eyes stared up at him without expression. Tom moved back and the eyes continued to stare. They weren't seeing any-

thing. "Go to sleep," he whispered. The eyes closed instantly.

Kelly was saying that nobody ever got hurt on a construction job unless somebody was dumb. "An' most times you don't realize how dumb what you're doin' is until somebody does get hurt."

"The dumb part was gettin' a kid, an' not even an operator at that, up on a machine," said Dennis in his smuggest voice.

"I heard you try to sing that song before," said old Peebles quietly. "I hate to have to point out anything like this to a man because it don't do any good to make comparisons. But I've worked with that fella Rivera for a long time now, an' I've seen 'em as good but doggone few better. As far as you're concerned, you're O. K. on a pan, but the kid could give you cards and spades and still make you look like a cost accountant on a dozer."

Dennis half rose and mouthed something filthy. He looked at Al Knowles for backing and got it. He looked around the circle and got none. Peebles lounged back, sucking on his pipe, watching from under those bristling brows. Den-

nis subsided, running now on another tack.

"So what does that prove? The better you say he is, the less reason he had to fall off a cat and get himself hurt."

"I haven't got the thing straight yet," said Chub, in a voice whose tone indicated 'I hate to admit it, but—' "

About this time Tom returned, like a sleepwalker, standing with the brilliant pressure lantern between him and Dennis. Dennis rambled right on, not knowing he was anywhere near: "That's something you never will find out. That Puerto Rican is a pretty husky kid. Could be Tom said somethin' he didn't like an' he tried to put a knife in Tom's back. They all do, y'know. Tom didn't get all that bashin' around just stoppin' a machine. They must of went round an' round for a while an' the goony wound up with a busted back. Tom sets the dozer to walk him down while he lies there and comes on down here and tries to tell us—" His voice fluttered to a stop as Tom loomed over him.

Tom grabbed the pan operator up by the slack of his shirt front with his uninjured arm and shook him like an empty burlap bag.

"Skunk," he growled. "I oughta lower th' boom on you." He set Dennis on his feet and backhanded his face with the edge of his forearm. Dennis went down—cowered down, rather than fell. "Aw, Tom, I was just talkin'. Just a joke, Tom, I was just—"

"Yellow, too," snarled Tom, stepping forward raising a solid Texan boot. Peebles barked "Tom!" and the foot came back to the ground.

"Out o' my sight," rumbled the foreman. "Git!"

Dennis got. Al Knowles said vaguely, "Naow Tom, y'all cain't—"

"You, y'walleyed string-bean!" Tom raved, his voice harsh and strained. "Go 'long with yer Siamese twin!"

"O. K., O. K.," said Al, white-faced, and disappeared into the dark after Dennis.

"Nuts to this," said Chub. "I'm turnin' in." He went to a crate and hauled out a mosquito-hooded sleeping bag and went off without another word. Harris and Kelly, who were both on their feet, sat down again. Old Peebles hadn't moved.

Tom stood staring out into the dark, his arms straight at his sides, his fists knotted.

"Sit down," said Peebles gently. Tom turned and stared at him.

"Sit down. I can't change that dressing 'less you do." He pointed at the bandage around Tom's elbow. It was red, a widening stain, the tattered tissues having parted as the big Georgian bunched his infuriated muscles. He sat down.

"Talkin' about dumbness," said Harris calmly, as Peebles went to work, "I was about to say that I got the record. I done the dumbest thing anybody ever did do on a machine. You can't top it."

"I could," said Kelly. "Runnin' a crane dragline once. Put her in boom gear and started to boom her

up. Had an eighty-five-foot stick on her. Machine was standing on wooden mats in th' middle of a swamp. Heard the motor miss and got out of the saddle to look at the filter-glass. Messed around back there longer than I figured, and the boom went straight up in the air and fell backwards over the cab. Th' jolt tilted my mats an' she slid backwards slow and stately as you please, butt-first into the mud. Buried up to the eyeballs, she was." He laughed quietly. "Looked like a ditching machine!"

"I still say I done the dumbest thing ever, bar none," said Harris. "It was on a river job, widening a channel. I come back to work from a three-day binge, still rum-dumb. Got up on a dozer an' was workin' around on the edge of a twenty-foot cliff. Down at the foot of the cliff was a big hickory tree, an' growin' right along the edge was a great big limb. I got the dopey idea I should break it off. I put one track on the limb and the other on the cliff edge and run out away from the trunk. I was about halfway out, an' the branch saggin' some, before I thought what would happen if it broke. Just about then it did break. You know hickory—if it breaks at all it breaks altogether. So down we go into thirty feet of water—me an' the cat. I got out from under somehow. When all them bubbles stopped comin' up I swum around lookin' down at it. I was still paddlin' around when the superintendent came rushin' up. He wants to know what's up. I yell at him, 'Look down there, the way that water is movin' an' shiftin', looks like the cat is workin' down there.'" He pursed his lips and *tsk tsked.* My, that man said some nasty things to me.

"Where'd you get your next job?" Kelly exploded.

"Oh, he didn't fire me," said Harris soberly. "Said he couldn't afford to fire a man as dumb as that. Said he wanted me around to look at whenever he felt bad."

Tom said, "Thanks, you guys. That's as good a way as any of sayin' that everybody makes mistakes." He stood up, examining the new dressing, turning his arm in front of the lantern. "You all can think what you please, but I don't recollect there was any dumbness went on on that mesa this evenin'. That's finished with, anyway. Do I have to say that Dennis' idea about it is all wet?"

Harris said one foul word that completely disposed of Dennis and anything he might say.

Peebles said, "It'll be all right. Dennis an' his popeyed friend'll hang together, but they don't amount to anything. Chub'll do whatever he's argued into."

"So you got 'em all lined up, hey?" Tom shrugged. "In the meantime, are we going to get an airfield built?"

"We'll get it built," Peebles said. "Only—Tom, I got no right to give you any advice, but go easy on the rough stuff after this. It does a lot of harm."

"I will if I can," said Tom gruffly. They broke up and turned in.

Peebles was right. It did do harm. It made Dennis use the word "murder" when they found, in the morning, that Rivera had died during the night.

The work progressed in spite of everything that had happened. With equipment like that, it's hard to slow things down. Kelly bit two cubic yards out of the bluff with every swing of the big shovel, and Dumptors are the fastest short-haul earth movers yet devised. Dennis kept the service road clean for them with his pan, and Tom and Chub spelled each other on the bulldozer they had detached from its pan to make up for the lack of the Seven, spending their alternate periods with transit and stakes. Peebles was rod-man for the surveys, and in between times worked on setting up his field shop, keeping the water cooler and battery chargers running, and lining up his forge and welding tables. The operators fueled and serviced their own equipment, and there was little delay. Rocks and marl came out of the growing cavity in the side of the central mesa—a whole third of it had to come out—were spun down to the edge of the swamp, which lay across the lower end of the projected runway, in the hornet-howling dump-tractors, their big driving wheels churned up vast clouds of dust, and were dumped and spread and walked in by the whining two-cycle dozer When muck began to pile up in front of the fill, it was blasted out of the way with carefully placed charges of sixty percent dynamite and the craters filled with rocks, stone from the ruins, and surfaced with easily-compacting marl, run out of a clean deposit by the pan.

And when he had his shop set up, Peebles went up the hill to get the Seven. When he got to it he just stood there for a moment scratching his head, and then, shaking his head, he ambled back down the hill and went for Tom.

"Been looking at the Seven," he said, when he had flagged the moaning two-cycle and Tom had climbed off.

"What'd you find?"

Peebles held out an arm. "A list as long as that." He shook his head. "Tom, what really happened up there?"

"Governor went haywire and she run away," Tom said promptly, deadpan.

"Yeah, but—" For a long moment he held Tom's eyes. Then he sighed. "O. K., Tom. Anyhow, I can't do a thing up there. We'll have to bring her back and I'll have to have this tractor to tow her down. And first I have to have some help—the track idler adjustment bolt's busted and the right track is off the track rollers."

"Oh-h-h. So that's why she couldn't get to the kid, running on the starting motor. Track would hardly turn, hey?"

"It's a miracle she ran as far as she did. That track is really jammed up. Riding right up on the roller flanges. And that ain't the half of it. The head's gone, like Harris said, and Lord only

knows what I'll find when I open her up."

"Why bother?"

"What?"

"We can get along without that dozer," said Tom suddenly. "Leave her where she is. There's lots more for you to do."

"But what for?"

"Well, there's no call to go to all that trouble."

Peebles scratched the side of his nose and said, "I got a new head, track master pins—even a spare starting motor. I got tools to make what I don't stock." He pointed at the long row of dumps left by the hurtling dump-tractors while they had been talking. "You got a pan tied up because you're using this machine to doze with, and you can't tell me you can't use another one. You're gonna have to shut down one or two o' those Dumptors if you go on like this."

"I had all that figured out as soon as I opened my mouth," Tom said sullenly. "Let's go."

They climbed on the tractor and took off, stopping for a moment at the beach outcropping to pick up a cable and some tools.

Daisy Etta sat at the edge of the mesa, glowering out of her stilted headlights at the soft sward which still bore the impression of a young body and the tramplings of the stretcher-bearers. Her general aspect was woebegone—there were scratches on her olive-drab paint and the bright metal of the scratches was already dulled red by the earliest powder-rust. And though the ground was level, she was not, for her right track was off its lower rollers, and she stood slightly canted, like a man who has had a broken hip. And whatever passed for consciousness within her mulled over that paradox of the bulldozer that every operator must go through while he is learning his own machine.

It is the most difficult thing of all for the beginner to understand, that paradox. A bulldozer is a crawling powerhouse, a behemoth of noise and toughness, the nearest thing to the famous irresistible force. The beginner, awed and with the pictures of unconquerable Army tanks printed on his mind from the newsreels, takes all in his stride and with a sense of limitless power treats all obstacles alike, not knowing the fragility of a cast-iron radiator core, the mortality of tempered manganese, the friability of overheated babbitt, and most of all, the ease with which a tractor can bury itself in mud. Climbing off to stare at a machine which he has reduced in twenty seconds to a useless hulk, or which was running a half-minute before on ground where it now has its tracks out of sight, he has that sense of guilty disappointment which overcomes any man on having made an error in judgment.

So, as she stood, *Daisy Etta* was broken and useless. These soft persistent bipeds had built her, and if they were like any other race that built machines, they could care for them. The ability to reverse the tension of a spring, or twist a control rod, or reduce to zero the fric-

tion in a nut and lock-washer, was not enough to repair the crack in a cylinder head nor bearings welded to a crankshaft in an overheated starting motor. There had been a lesson to learn. It had been learned. *Daisy Etta* would be repaired, and the next time—well, at least she would know her own weaknesses.

Tom swung the two-cycle machine and edged in next to the Seven, with the edge of his blade all but touching *Daisy Etta's* push-beam. They got off and Peebles bent over the drum-tight right track.

"Watch yourself," said Tom.

"Watch what?"

"Oh—nothin', I guess." He circled the machine, trained eyes probing over frame and fittings. He stepped forward suddenly and grasped the fuel-tank drain cock. It was closed. He opened it; golden oil gushed out. He shut it off, climbed up on the machine and opened the fuel cap on top of the tank. He pulled out the bayonet gauge, wiped it in the crook of his knee, dipped and withdrew it.

The tank was more than three quarters full.

"What's the matter?" asked Peebles, staring curiously at Tom's drawn face.

"Peeby, I opened the cock to drain this tank. I left it with oil runnin' out on the ground. She shut herself off."

"Now, Tom, you're lettin' this thing get you down. You just thought you did. I've seen a main-line valve shut itself off when it's worn bad, but only 'cause the fuel pump pulls it shut when the motor's runnin'. But not a gravity drain."

"Main-line valve?" Tom pulled the seat up and looked. One glance was enough to show him that this one was open.

"She opened this one, too."

"O. K.—O. K. Don't look at me like that!" Peebles was as near to exasperation as he could possibly get. "What difference does it make?"

Tom did not answer. He was not the type of man who, when faced with something beyond his understanding, would begin to doubt his own sanity. His was a dogged insistence that what he saw and sensed was what had actually happened. In him was none of the fainting fear of madness that another, more sensitive, man might feel. He doubted neither himself nor his evidence, and so could free his mind for searching out the consuming "why" of a problem. He knew instinctively that to share "unbelievable" happenings with anyone else, even if they had really occurred, was to put even further obstacles in his way. So he kept his clamlike silence and stubbornly, watchfully, investigated.

The slipped track was so tightly drawn up on the roller flanges that there could be no question of pulling the master pin and opening the track up. It would have to be worked back in place—a very delicate operation, for a little force applied in the wrong direction would be enough to run the track off altogether. To complicate things, the

blade of the Seven was down on the ground and would have to be lifted before the machine could be maneuvered, and its hydraulic hoist was useless without the motor.

Peebles unhooked twenty feet of half-inch cable from the rear of the smaller dozer, scratched a hole in the ground under the Seven's blade, and pushed the eye of the cable through. Climbing over the moldboard, he slipped the eye on to the big towing hook bolted to the underside of the belly-guard. The other end of the cable he threw out on the ground in front of the machine. Tom mounted the other dozer and swung into place, ready to tow. Peebles hooked the cable onto Tom's drawbar, hopped up on the Seven. He put her in neutral, disengaged the master clutch, and put the blade control over into "float" position, then raised an arm.

Tom, perched upon the arm rest of his machine, looking backwards, moved slowly, taking up the slack in the cable. It straightened and grew taut, and as it did it forced the Seven's blade upward. Peebles waved for slack and put the blade control into "hold." The cable bellied downward away from the blade.

"Hydraulic system's O. K., anyhow," called Peebles, as Tom throttled down. "Move over and take a strain to the right, sharp as you can without fouling the cable on the track. We'll see if we can walk this track back on."

Tom backed up, cut sharply to the right, and drew the cable out almost at right angles to the other machine. Peebles held the right track of the Seven with the brake and released both steering clutches. The left track now could turn free, the right not at all. Tom was running at a quarter throttle in his lowest gear, so that his machine barely crept along, taking the strain. The Seven shook gently and began to pivot on the taut right track, unbelievable foot-pounds of energy coming to bear on the front of the track where it rode high up on the idler wheel. Peebles released the right brake with his foot and applied it again in a series of skilled, deft jerks. The track would move a few inches and stop again, force being applied forward and sideward alternately, urging the track persuasively back in place. Then, a little jolt and she was in, riding true on the five truck rollers, the two track carrier rollers, the driving sprocket and the idler.

Peebles got off and stuck his head in between the sprocket and the rear carrier, squinting down and sideways to see if there were any broken flanges or roller bushes. Tom came over and pulled him out by the seat of his trousers. "Time enough for that when you get her in the shop," he said, masking his nervousness. "Reckon she'll roll?"

"She'll roll. I never saw a track in that condition come back that easy. By gosh, it's as if she was tryin' to help!"

"They'll do it sometimes," said Tom, stiffly. "You better take the tow-tractor, Peeby. I'll stay with this'n."

"Anything you say."

And cautiously they took the steep slope down, Tom barely holding the brakes, giving the other machine a straight pull all the way. And so they brought *Daisy Etta* down to Peebles' outdoor shop, where they pulled her cylinder head off, took off her starting motor, pulled out a burned clutch facing, had her quite helpless—

And put her together again.

"I tell you it was outright, cold-blooded murder," said Dennis hotly. "An' here we are takin' orders from a guy like that. What are we goin' to do about it?" They were standing by the cooler—Dennis had run his machine there to waylay Chub.

Chub Horton's cigar went down and up like a semaphore with a short circuit. "We'll skip it. The blacktopping crew will be here in another two weeks or so, an' we can make a report. Besides, I don't know what happened up there any more than you do. In the meantime we got a runway to build."

"You don't know what happened up there? Chub, you're a smart man. Smart enough to run this job better than Tom Jaeger even if he wasn't crazy. And you're surely smart enough not to believe all that cock and bull about that tractor runnin' out from under that grease-monkey. Listen—" he leaned forward and tapped Chub's chest. "He said it was the governor. I saw that governor myself an' heard ol' Peebles say there wasn't a thing wrong with it. Th' throttle control rod had slipped off its yoke, yeah—but you know what a tractor will do when the throttle control goes out. It'll idle or stall. It won't run away, whatever."

"Well, maybe so, but—"

"But nothin'! A guy that'll commit murder ain't sane. If he did it once, he can do it again and I ain't fixin' to let that happen to me."

Two things crossed Chub's steady but not too bright mind at this. One was that Dennis, whom he did not like but could not shake, was trying to force him into something that he did not want to do. The other was that under all of his swift talk Dennis was scared spitless.

"What do you want to do—call up the sheriff?"

Dennis ha-ha-ed appreciatively—one of the reasons he was so hard to shake. "I'll tell you what we can do. As long as we have you here, he isn't the only man who knows the work. If we stop takin' orders from him, you can give 'em as good or better. An' there won't be anything he can do about it."

"Doggone it, Dennis," said Chub, with sudden exasperation. "What do you think you're doin'—handin' me over the keys to the kingdom or something? What do you want to see me bossin' around here for?" He stood up. "Suppose we did what you said? Would it get the field built any quicker? Would it get me any more money in my pay envelope? What do you think I want—glory? I passed up a chance to run for councilman once. You think I'd raise a finger to get a bunch of mugs to do what I say—

when they do it anyway?"

"Aw, Chub—I wouldn't cause trouble just for the fun of it. That's not what I mean at all. But unless we do something about that guy we ain't safe. Can't you get that through your head?"

"Listen, windy. If a man keeps busy enough he can't get into no trouble. That goes for Tom—you might keep that in mind. But it goes for you, too. Get back up on that rig an' get back to the marl pit." Dennis, completely taken by surprise, turned to his machine.

"It's a pity you can't move earth with your mouth," said Chub as he walked off. "They could have left you to do this job singlehanded."

Chub walked slowly toward the outcropping, switching at beach pebbles with a grade stake and swearing to himself. He was essentially a simple man and believed in the simplest possible approach to everything. He liked a job where he could do everything required and where nothing turned up to complicate things. He had been in the grading business for a long time as an operator and survey party boss, and he was remarkable for one thing—he had always held aloof from the cliques and internecine politics that are the breath of life to most construction men. He was disturbed and troubled at the backstabbing that went on around him on various jobs. If it was blunt, he was disgusted, and subtlety simply left him floundering and bewildered. He was stupid enough so that his basic honesty manifested itself in his speech and actions, and he had learned that complete honesty in dealing with men above and below him was almost invariably painful to all concerned, but he had not the wit to act otherwise, and did not try to. If he had a bad tooth, he had it pulled out as soon as he could. If he got a raw deal from a superintendent over him, that superintendent would get told exactly what the trouble was, and if he didn't like it, there were other jobs. And if the pulling and hauling of cliques got in his hair, he had always said so and left. Or he had sounded off and stayed; his completely selfish reaction to things that got in the way of his work had earned him a lot of regard from men he had worked under. And so, in this instance, he had no hesitation about choosing a course of action. Only—how did you go about asking a man if he was a murderer?

He found the foreman with an enormous wrench in his hand, tightening up the new track adjustment bolt they had installed in the Seven.

"Hey, Chub! Glad you turned up. Let's get a piece of pipe over the end of this thing and really bear down." Chub went for the pipe, and they fitted it over the handle of the four-foot wrench and hauled until the sweat ran down their backs, Tom checking the track clearance occasionally with a crowbar. He finally called it good enough and they stood there in the sun gasping for breath.

"Tom," panted Chub, "did you

kill that Puerto Rican?"

Tom's head came up as if someone had burned the back of his neck with a cigarette.

"Because," said Chub, "if you did you can't go on runnin' this job."

Tom said, "That's a lousy thing to kid about."

"You know I ain't kiddin'. Well, did you?"

"No!" Tom sat down on a keg, wiped his face with a bandanna. "What's got into you?"

"I just wanted to know. Some of the boys are worried about it."

Tom's eyes narrowed. "Some of the boys, huh? I think I get it. Listen to me, Chub. Rivera was killed by that thing there." He thumbed over his shoulder at the Seven, which was standing ready now, awaiting only the building of a broken cutting corner on the blade. Peebles was winding up the welding machine as he spoke. "If you mean, did I put him up on the machine before he was thrown, the answer is yes. That much I killed him, and don't think I don't feel it. I had a hunch something was wrong up there, but I couldn't put my finger on it and I certainly didn't think anybody was going to get hurt."

"Well, what was wrong?"

"I still don't know." Tom stood up. "I'm tired of beatin' around the bush, Chub, and I don't much care any more what anybody thinks. There's somethin' wrong with that Seven, something that wasn't built into her. They don't make tractors better'n that one, but whatever it was happened up there on the mesa has queered this one. Now go ahead and think what you like, and dream up any story you want to tell the boys. In the meantime you can pass the word—nobody runs that machine but me, understand? Nobody!"

"Tom—"

Tom's patience broke. "That's all I'm going to say about it! If anybody else gets hurt, it's going to be me, understand? What more do you want?"

He strode off, boiling. Chub stared after him, and after a long moment reached up and took the cigar from his lips. Only then did he realize that he had bitten it in two; half the butt was still inside his mouth. He spat and stood there, shaking his head.

"How's she going, Peeby?"

Peebles looked up from the welding machine. "Hi, Chub, have her ready for you in twenty minutes." He gauged the distance between the welding machine and the big tractor. "I should have forty feet of cable," he said, looking at the festoons of arc and ground cables that hung from the storage hooks in the back of the welder. "Don't want to get a tractor over here to move the thing, and don't feel like cranking up the Seven just to get it close enough." He separated the arc cable and threw it aside, walked to the tractor, paying the ground cable off his arm. He threw out the last of his slack and grasped the ground clamp when he was eight feet from the machine. Taking it in his left hand, he pulled hard,

reaching out with his right to grasp the moldboard of the Seven, trying to get it far enough to clamp on to the machine.

Chub stood there watching him, chewing on his cigar, absent-mindedly diddling with the controls on the arc-welder. He pressed the starter-button, and the six-cylinder motor responded with a purr. He spun the work-selector dials idly, threw the arc generator switch—

A bolt of incredible energy, thin, searing, blue-white, left the rod-holder at his feet, stretched itself *fifty feet* across to Peebles, whose fingers had just touched the moldboard of the tractor. Peebles' head and shoulders were surrounded for a second by a violet numbus, and then he folded over and dropped. A circuit breaker clacked behind the control board of the welder, but too late. The Seven rolled slowly backward, without firing, on level ground, until it brought up against a road-roller.

Chub's cigar was gone, and he didn't notice it. He had the knuckles of his right hand in his mouth, and his teeth sunk into the pudgy flesh. His eyes protruded; he crouched there and quivered, literally frightened out of his mind. For old Peebles was almost burned in two.

They buried him next to Rivera. There wasn't much talk afterwards; the old man had been a lot closer to all of them than they had realized until now. Harris, for once in his rum-dumb, lighthearted life, was quiet and serious, and Kelly's walk seemed to lose some of its litheness. Hour after hour Dennis' flabby mouth worked, and he bit at his lower lip until it was swollen and tender. Al Knowles seemed more or less unaffected, as was to be expected from a man who had something less than the brains of a chicken. Chub Horton had snapped out of it after a couple of hours and was very nearly himself again. And in Tom Jaeger swirled a black, furious anger at this unknowable curse that had struck the camp.

And they kept working. There was nothing else to do. The shovel kept up its rhythmic swing and dig, swing and dump, and the Dumptors screamed back and forth between it and the little that there was left of the swamp. The upper end of the runway was grassed off; Chub and Tom set grade stakes and Dennis began the long job of cutting and filling the humpy surface with his pan. Harris manned the other and followed him, a cut behind. The shape of the runway emerged from the land, and then that of the paralleling taxiway; and three days went by. The horror of Peebles' death wore off enough so that they could talk about it, and very little of the talk helped anybody. Tom took his spells at everything, changing over with Kelly to give him a rest from the shovel, making a few rounds with a pan, putting in hours on a Dumptor. His arm was healing slowly but clean, and he worked grimly in spite of it taking a perverse sort of pleasure from the pain of it. Every man on the job watched his machine with the so-

licitude of a mother with her first-born; a serious breakdown would have been disastrous without a highly skilled mechanic.

The only concession that Tom allowed himself in regard to Peebles' death was to corner Kelly one afternoon and ask him about the welding machine. Part of Kelly's rather patchy past had been spent in a technical college, where he had studied electrical engineering and women. He had learned a little of the former and enough of the latter to get him thrown out on his ear. So, on the off-chance that he might know something about the freak arc, Tom put it to him.

Kelly pulled off his high-gauntlet gloves and batted sandflies with them. "What sort of an arc was that? Boy, you got me there. Did you ever hear of a welding machine doing like that before?"

"I did not. A welding machine just don't have that sort o' push. I saw a man get a full jolt from a 400-amp welder once, an' although it sat him down it didn't hurt him any."

"It's not amperage that kills people," said Kelly, "it's voltage. Voltage is the pressure behind a current, you know. Take an amount of water, call it amperage. If I throw it in your face, it won't hurt you. If I put it through a small hose you'll feel it. But if I pump it through the tiny holes on a Diesel injector nozzle at about twelve hundred pounds, it'll draw blood. But a welding arc generator just is not wound to build up that kind of voltage. I can't see where any short circuit anywhere through the armature or field windings could do such a thing."

"From what Chub said, he had been foolin' around with the work selector. I don't think anyone touched the dials after it happened. The selector dial was run all the way over to the low current application segment, and the current control was around the halfway mark. That's not enough juice to get you a good bead with a quarter-inch rod, let alone kill somebody—or roll a tractor back thirty feet on level ground."

"Or jump fifty feet," said Kelly. "It would take thousands of volts to generate an arc like that."

"Is it possible that something in the Seven could have pulled that arc? I mean, suppose the arc wasn't driven over, but was drawn over? I tell you, she was hot for four hours after that."

Kelly shook his head. "Never heard of any such thing. Look; just to have something to call them, we call direct current terminals positive and negative, and just because it works in theory we say that current flows from negative to positive. There couldn't be any more positive attractive in one electrode than there is negative drive in the other; see what I mean?"

"There couldn't be some freak condition that would cause a sort of oversize positive field? I mean one that would suck out the negative flow all in a heap, make it smash through under a lot of pressure like the water you were talking about through an injector nozzle?"

"No, Tom. It just don't work that way, far as anyone knows. I dunno, though—there are some things about static electricity that nobody understands. All I can say is that what happened couldn't happen and if it did it couldn't have killed Peebles. And you know the answer to that."

Tom glanced away at the upper end of the runway, where the two graves were. There was bitterness and that turbulent anger naked there for a moment, and he turned and walked away without another word. And when he went back to have another look at the welding machine, *Daisy Etta* was gone.

Al Knowles and Harris squatted together near the water cooler.

"Bad," said Harris.

"Nevah saw anythin' like it," said Al. "Ol' Tom come back f'm the shop theah jus' *raisin'* Cain. 'Weah's 'at Seven gone? Weah's 'at Seven?' I never heered sech cah'ins on."

"Dennis did take it, huh?"

"Sho' did."

Harris said, "He came spoutin' around to me a while back, Dennis did. Chub'd told him Tom said for everybody to stay off that machine. Dennis was mad as a wet hen. Said Tom was carryin' that kind o' business too far. Said there was probably somethin' about the Seven Tom didn't want us to find out. Might incriminate him. Dennis is ready to say Tom killed the kid."

"Reckon he did, Harris?"

Harris shook his head. "I've known Tom too long to think that. If he won't tell us what really happened up on the mesa, he has a reason for it. How'd Dennis come to take the dozer?"

"Blew a front tire on his pan. Came back heah to git anothah rig—maybe a Dumptor. Saw th' Seven standin' theah ready to go. Stood theah lookin' at it and cussin' Tom. Said he was tired of bashin' his kidneys t'pieces on them othah rigs an' bedamned if he wouldn't take suthin' that rode good fo' a change. I tol' him ol' Tom'd raise th' roof when he found him on it. He had a couple mo' things t'say 'bout Tom then."

"I didn't think he had the guts to take the rig."

"Aw, he talked hisself blind mad."

They looked up as Chub Horton trotted up, panting. "Hey, you guys, come on. We better get up there to Dennis."

"What's wrong?" asked Harris, climbing to his feet.

"Tom passed me a minute ago lookin' like the wrath o' God and hightailin' it for the swamp fill. I asked him what was the matter and he hollered that Dennis had took the Seven. Said he was always talkin' about murder, and he'd get his fill of it foolin' around that machine." Chub went walleyed, licked his lips beside his cigar.

"Oh-oh," said Harris quietly. "That's the wrong kind o' talk for just now."

"You don't suppose he—"

"Come on!"

They saw Tom before they were halfway there. He was walking slowly, with his head down. Harris shouted; Tom raised his face, stopped, stood there waiting with a peculiarly slumped stance.

"Where's Dennis?" barked Chub.

Tom waited until they were almost up to him and then weakly raised an arm and thumbed over his shoulder. His face was green.

"Tom—is he"

Tom nodded, and swayed a little. His granite jaw was slack.

"Al, stay with him. He's sick. Harris, let's go."

Tom was sick, then and there. Very. Al stood gaping at him, fascinated.

Chub and Harris found Dennis. All of twelve square feet of him, ground and churned and rolled out into a torn-up patch of earth. *Daisy Etta* was gone.

Back at the outcropping, they sat with Tom while Al Knowles took a Dumptor and roared away to get Kelly.

"You saw him?" he said dully after a time.

Harris said "Yeh."

The screaming Dumptor and a mountainous cloud of dust arrived, Kelly driving, Al holding on with a death-grip to the dump-bed guards. Kelly flung himself off, ran to Tom. "Tom—what is all this? Dennis dead? And you . . . you—"

Tom's head came up slowly, the slackness going out of his long face, a light suddenly coming into his eyes. Until this moment it had not crossed his mind what these men might think.

"I—what?"

"Al says you killed him."

Tom's eyes flicked at Al Knowles, and Al winced as if the glance had been a quirt.

Harris said, "What about it, Tom?"

"Nothing about it. He was killed by that Seven. You saw that for yourself."

"I stuck with you all along," said Harris slowly. "I took everything you said and believed it."

"This is too strong for you?" Tom asked.

Harris nodded. "Too strong, Tom."

Tom looked at the grim circle of faces and laughed suddenly. He stood up, put his back against a tall crate. "What do you plan to do about it?"

There was a silence. "You think I went up there and knocked that windbag off the machine and run over him?" More silence. "Listen. I went up there and saw what you saw. He was dead before I got there. That's not good enough either?" He paused and licked his lips. "So after I killed him I got up on the tractor and drove it far enough away so you couldn't see or hear it when you got there. And then I sprouted wings and flew back so's I was halfway here when you met me—*ten minutes* after I spoke to Chub on my way up!"

Kelly said vaguely, "Tractor?"

"Well," said Tom harshly to Harris, "was the tractor there when you

and Chub went up and saw Dennis?"

"No—"

Chub smacked his thigh suddenly. "You could of drove it into the swamp, Tom."

Tom said angrily, "I'm wastin' my time. You guys got it all figured out. Why ask me anything at all?"

"Aw, take it easy," said Kelly. "We just want the facts. Just what did happen? You met Chub and told him that Dennis would get all the murderin' he could take if he messed around that machine. That right?"

"That's right."

"Then what?"

"Then the machine murdered him."

Chub, with remarkable patience, asked, "What did you mean the day Peebles was killed when you said that something had queered the Seven up there on the mesa?"

Tom said furiously, "I meant what I said. You guys are set to crucify me for this and I can't stop you. Well, listen. Something's got into that Seven. I don't know what it is and I don't think I ever will know. I thought that after she smashed herself up that it was finished with. I had an idea that when we had her torn down and helpless we should have left her that way. I was dead right but it's too late now. She's killed Rivera and she's killed Dennis and she sure had something to do with killing Peebles. And my idea is that she won't stop as long as there's a human being alive on this island."

"Whaddaya know!" said Chub.

"Sure, Tom, sure," said Kelly quietly. "That tractor is out to get us. But don't worry; we'll catch it and tear it down. Just don't you worry about it any more; it'll be all right."

"That's right, Tom," said Harris. "You just take it easy around camp for a couple of days till you feel better. Chub and the rest of us will handle things for you. You had too much sun."

"You're a swell bunch of fellows," gritted Tom, with the deepest sarcasm. "You want to live," he shouted, "git out there and throw that maverick bulldozer!"

"That maverick bulldozer is at the bottom of the swamp where you put it," growled Chub. His head lowered and he started to move in. "Sure we want to live. The best way to do that is to put you where you can't kill anybody else. *Get him!*"

He leaped; Tom straightarmed him with his left and crossed with his right. Chub went down, tripping Harris. Al Knowles scuttled to a toolbox and dipped out a fourteen-inch crescent wrench. He circled around, keeping out of trouble, trying to look useful. Tom loosened a haymaker at Kelly, whose head seemed to withdraw like a turtle's; it whistled over, throwing Tom badly off balance. Harris, still on his knees, tackled Tom's legs; Chub hit him in the small of the back with a meaty shoulder, and Tom went flat on his face. Al Knowles, holding the wrench in both hands, swept it up and back like a baseball

bat; at the top of it's swing Kelly reached over, snatched it out of his hands and tapped Tom delicately behind the ear with it. Tom went limp.

It was late, but nobody seemed to feel like sleeping. They sat around the pressure lantern, talking idly. Chub and Kelly played an inconsequential game of casino, forgetting to pick up their points; Harris paced up and down like a man in a cell, and Al Knowles was squinched up close to the light, his eyes wide and watching, watching—

"I need a drink," said Harris.

"Tens," said one of the casino players.

Al Knowles said, "We shoulda killed him. We oughta kill him now."

"There's been too much killin' already," said Chub. "Shut up, you." And to Kelly, "With big casino," sweeping up cards.

Kelly caught his wrist and grinned. "Big casino's the ten of diamonds, not the ten of hearts. Remember?"

"Oh."

"How long before the blacktopping crew will be here?" quavered Al Knowles.

"Twelve days," said Harris. "And they better bring some likker."

"Hey you guys."

They fell silent.

"Hey!"

"It's Tom," said Kelly. "Building sixes, Chub."

"I'm gonna go kick his ribs in," said Knowles, not moving.

"I heard that," said the voice from the darkness. "If I wasn't hogtied—"

"We know what you'd do," said Chub. "How much proof do you think we need?"

"Chub, you don't have to do any more to him!" It was Kelly, flinging his cards down and getting up. "Tom, you want water?"

"Yes."

"Siddown, siddown," said Chub.

"Let him lie there and bleed," Al Knowles said.

"Nuts!" Kelly went and filled a cup and brought it to Tom. The big Georgian was tied thoroughly, wrists together, taut rope between elbows and elbows behind his back, so that his hands were immovable over his solar plexus. His knees and ankles were bound as well, although Knowles' little idea of a short rope between ankles and throat hadn't been used.

"Thanks, Kelly." Tom drank greedily, Kelly holding his head. "Goes good." He drank more. "What hit me?"

"One of the boys. 'Bout the time you said the cat was haunted."

"Oh yeah." Tom rolled his head and blinked with pain.

"Any sense asking you if you blame us?"

"Kelly, does somebody else have to get killed before you guys wake up?"

"None of us figure there will be any more killin'—now."

The rest of the men drifted up. "He willing to talk sense?" Chub wanted to know.

Al Knowles laughed, "Hyuk! hyuk! Don't he look dangerous now!"

Harris said suddenly, "Al, I'm gonna hafta tape your mouth with the skin off your neck."

"Am I the kind of guy that makes up ghost stories?"

"Never have that I know of, Tom." Harris kneeled down beside him. "Never killed anyone before, either."

"Oh, get away from me. Get away," said Tom tiredly.

"Get up and make us," jeered Al.

Harris got up and backhanded him across the mouth. Al squeaked, took three steps backward and tripped over a drum of grease. "I told you," said Harris almost plaintively. "I *told* you, Al."

Tom stopped the bumble of comment. "Shut up!" he hissed. "SHUT UP!" he roared.

They shut.

"Chub," said Tom, rapidly, evenly. "What did you say I did with that Seven?"

"Buried it in the swamp."

"Yeh. Listen."

"Listen at what?"

"Be quiet and listen!"

So they listened. It was another still, windless night, with a thin crescent of moon showing nothing true in the black and muffled silver landscape. The smallest whisper of surf drifted up from the beach, and from far off to the right, where the swamp was, a scandalized frog croaked protest at the manhandling of his mudhole. But the sound that crept down, freezing their bones, came from the bluff behind their camp.

It was the unmistakeable staccato of a starting engine.

"The Seven'."

"'At's right, Chub," said Tom.

"Wh-who's crankin' her up?"

"Are we all here?"

"All but Peebles and Dennis and Rivera," said Tom.

"It's Dennis' ghost," moaned Al.

Chub snapped, "Shut up, lame-brain."

"She's shifted to Diesel." said Kelly, listening.

"She'll be here in a minute," said Tom. "Y'know, fellas, we can't all be crazy, but you're about to have a time convincin' yourself of it."

"You like this, doncha?"

"Some ways. Rivera used to call that machine *Daisy Etta,* 'cause she's *de siete* in Spig. *Daisy Etta,* she wants her a man."

"Tom," said Harris, "I wish you'd stop that chatterin'. You make me nervous."

"I got to do somethin'. I can't run," Tom drawled.

"We're going to have a look," said Chub. "If there's nobody on that cat, we'll turn you loose."

"Mighty white of you. Reckon you'll get back before she does?"

"We'll get back. Harris, come with me. We'll get one of the pan tractors. They can outrun a Seven. Kelly, take Al and get the other one."

"Dennis' machine has a flat tire on the pan," said Al's quivering voice.

"Pull the pin and cut the cables,

then! Git!" Kelly and Al Knowles ran off.

"Good huntin', Chub."

Chub went to him, bent over. "I think I'm goin' to have to apologize to you, Tom."

"No you ain't. I'd a done the same. Get along now, if you think you got to. But hurry back."

"I got to. An' I'll hurry back."

Harris said, "Don't go 'way, boy." Tom returned the grin, and they were gone. But they didn't hurry back. They didn't come back at all.

It was Kelly who came pounding back, with Al Knowles on his heels, a half hour later. "Al—gimme your knife."

He went to work on the ropes. His face was drawn.

"I could see some of it," whispered Tom. "Chub and Harris?"

Kelly nodded. "There wasn't nobody on the Seven like you said." He said it as if there were nothing else in his mind, as if the most rigid self-control was keeping him from saying it over and over.

"I could see the lights," said Tom. "A tractor angling up the hill. Pretty soon another, crossing it, lighting up the whole slope."

"We heard it idling up there somewhere," Kelly said. "Olive-drab paint—couldn't see it."

"I saw the pan tractor turn over—oh, four, five times down the hill. It stopped, lights still burning. Then something hit it and rolled it again. That sure blacked it out. What turned it over first?"

"The Seven. Hanging up there just at the brow of the bluff. Waited until Chub and Harris were about to pass, sixty, seventy feet below. Tipped over the edge and rolled down on them with her clutches out. Must've been going thirty miles an hour when she hit. Broadside. They never had a chance. Followed the pan as it rolled down the hill and when it stopped booted it again."

"Want me to rub yo' ankles?" asked Al.

"You! Get outa my sight!"

"Aw, Tom—" whimpered Al.

"Skip it, Tom," said Kelly. "There ain't enough of us left to carry on that way. Al, you mind your manners from here on out, hear?"

"Ah jes' wanted to tell y'all. I knew you weren't lyin' 'bout Dennis, Tom, if only I'd stopped to think. I recollect when Dennis said he'd take that tractuh out . . . 'membah, Kelly? . . . he went an' got the crank and walked around to th' side of th' machine and stuck it in th' hole. It was barely in theah befo' the startin' engine kicked off. 'Whadda ya know!' he says t' me. 'She started by herse'f! I nevah pulled that handle!' And I said, 'She sho' rarin' t'go!'"

"You pick a fine time to 'recollec' something," gritted Tom. "C'mon—let's get out of here."

"Where to?"

"What do you know that a Seven can't move or get up on."

"That's a large order. A big rock, maybe."

"Ain't nothing that big around here," said Tom.

Kelly thought a minute, then

snapped his fingers. "Up on the top of my last cut with the shovel," he said. "It's fourteen feet if it's an inch. I was pullin' out small rock an' topsoil, and Chub told me to drop back and dip out marl from a pocket there. I sumped in back of the original cut and took out a whole mess o' marl. That left a big neck of earth sticking thirty feet or so out of the cliff. The narrowest part is only about four feet wide. If *Daisy Etta* tries to get us from the top, she'll straddle the neck and hang herself. If she tries to get us from below, she can't get traction to climb; it's too loose and too steep."

"And what happens if she builds herself a ramp?"

"We'll be gone from there."

"Let's go."

Al agitated for the choice of a Dumptor because of its speed, but was howled down. Tom wanted something that could not get a flat tire and that would need something really powerful to turn it over. They took the two-cycle pan tractor with the bulldozer blade that had been Dennis' machine and crept out into the darkness.

It was nearly six hours later that *Daisy Etta* came and woke them up. Night was receding before a paleness in the east, and a fresh ocean breeze had sprung up. Kelly had taken the first lookout and Al the second, letting Tom rest the night out. And Tom was far too tired to argue the arrangement. Al had immediately fallen asleep on his watch, but fear had such a sure, cold hold on his vitals that the first faint growl of the big Diesel engine snapped him erect. He tottered on the edge of the tall neck of earth that they slept on and squeaked as he scrabbled to get his balance.

"What's giving?" asked Kelly, instantly wide awake.

"It's coming," blubbered Al. "Oh my, oh my—"

Kelly stood up and stared into the fresh, dark dawn. The motor boomed hollowly, in a peculiar way heard twice at the same time as it was thrown to them and echoed back by the bluffs under and around them.

"It's coming and what are we goin' to do?" chanted Al. "What is going to happen?"

"My head is going to fall off," said Tom sleepily. He rolled to a sitting position, holding the brutalized member between his hands. "If that egg behind my ear hatches, it'll come out a full-sized jackhammer." He looked at Kelly. "Where is she?"

"Don't rightly know," said Kelly. "Somewhere down around the camp."

"Probably pickin' up our scent."

"Figure it can do that?"

"I figure it can do anything," said Tom. "Al, stop your moanin'."

The sun slipped its scarlet edge into the thin slot between sea and sky, and rosy light gave each rock and tree a shape and a shadow. Kelly's gaze swept back and forth, back and forth, until, minutes later, he saw movement.

"There she is!"

"Where?"

"Down by the grease rack."

Tom rose and stared. "What's she doin'?"

After an interval Kelly said, "She's workin'. Diggin' a swale in front of the fuel drums."

"You don't say. Don't tell me she's goin' to give herself a grease job."

"She don't need it. She was completely greased and new oil put in the crankcase after we set her up. But she might need fuel."

"Not more'n half a tank."

"Well, maybe she figures she's got a lot of work to do today." As Kelly said this Al began to blubber. They ignored him.

The fuel drums were piled in a pyramid at the edge of the camp, in forty-four-gallon drums piled on their sides. The Seven was moving back and forth in front of them, close up, making pass after pass, gouging earth up and wasting it out past the pile. She soon had a huge pit scooped out, about fourteen feet wide. six feet deep and thirty feet long, right at the very edge of the pile of drums.

"What you reckon she's playin' at?"

"Search me. She seems to want fuel, but I don't . . . look at that! She's stopped in the hole; she's pivoting, smashing the top corner of the moldboard into one of the drums on the bottom!"

Tom scraped the stubble on his jaw with his nails. "An' you wonder how much that critter can do! Why she's got the whole thing figured out. She knows if she tried to punch a hole in a fuel drum that she'd only kick it around. If she did knock a hole in it, how's she going to lift it? She's not equipped to handle hose, so . . . see? Look at her now! She just gets herself lower than the bottom drum on the pile, and punches a hole. She can do that then, with the whole weight of the pile holding it down. Then she backs her tank under the stream of fuel runnin' out!"

"How'd she get the cap off?"

Tom snorted and told them how the radiator cap had come off its hinges as he vaulted over the hood the day Rivera was hurt.

"You know," he said after a moment's thought, "if she knew as much then as she does now, I'd be snoozin' beside Rivera and Peebles. She just didn't know her way around then. She run herself like she'd never run before. She's learned plenty since."

"She has," said Kelly, "and here's where she uses it on us. She's headed this way."

She was. Straight out across the roughed-out runway she came, grinding along over the dew-sprinkled earth, yesterday's dust swirling up from under her tracks. Crossing the shoulder line, she took the rougher ground skillfully, angling up over the occasional swags in the earth, by-passing stones, riding free and fast and easily. It was the first time Tom had actually seen her clearly running without an operator, and his flesh crept as he watched. The machine was unnatural, her outline somehow unreal and dream-

like purely through the lack of the small silhouette of a man in the saddle. She looked hulked, compact, dangerous.

"What are we gonna do?" wailed Al Knowles.

"We're gonna sit and wait," said Kelly, "and you're gonna shut your trap. We won't know for five minutes yet whether she's going to go after us from down below or from up here."

"If you want to leave," said Tom gently, "go right ahead." Al sat down.

Kelly looked ruminatively down at his beloved power shovel, sitting squat and unlovely in the cut below them and away to their right. "How do you reckon she'd stand up against the dipper stick?"

"If it ever came to a rough-and-tumble," said Tom, "I'd say it would be just too bad for *Daisy Etta*. But she wouldn't fight. There's no way you could get the shovel within punchin' range; *Daisy*'d just stand there and laugh at you."

"I can't see her now," whined Al.

Tom looked. "She's taken the bluff. She's going to try it from up here. I move we sit tight and see if she's foolish enough to try to walk out here over that narrow neck. If she does, she'll drop on her belly with one track on each side. Probably turn herself over trying to dig out."

The wait then was interminable. Back over the hill they could hear the laboring motor; twice they heard the machine stop momentarily to shift gears. Once they looked at each other hopefully as the sound rose to a series of bellowing roars, as if she were backing and filling; then they realized that she was trying to take some particularly steep part of the bank and having trouble getting traction. But she made it; the motor revved up as she made the brow of the hill, and she shifted into fourth gear and came lumbering out into the open. She lurched up to the edge of the cut, stopped, throttled down, dropped her blade on the ground and stood there idling. Al Knowles backed away to the very edge of the tongue of earth they stood on, his eyes practically on stalks.

"O.K.—put up or shut up," Kelly called across harshly.

"She's looking the situation over," said Tom. "That narrow pathway don't fool her a bit."

Daisy Etta's blade began to rise, and stopped just clear of the ground. She shifted without clashing her gears, began to back slowly, still at little more than an idle.

"She's gonna jump!" screamed Al. "I'm gettin' out of here!"

"Stay here, you fool," shouted Kelly. "She can't get us as long as we're up here! If you go down, she'll hunt you down like a rabbit."

The blast of the Seven's motor was the last straw for Al. He squeaked and hopped over the edge, scrambling and sliding down the almost sheer face of the cut. He hit the bottom running.

Daisy Etta lowered her blade and raised her snout and growled forward, the blade loading. Six, seven, seven and a half cubic yards of dirt

piled up in front of her as she neared the edge. The loaded blade bit into the narrow pathway that led out to their perch. It was almost all soft, white, crumbly marl, and the great machine sank nose down into it, the monstrous overload of topsoil spilling down on each side.

"She's going to bury herself!" shouted Kelly.

"No—wait." Tom caught her arm. "She's trying to turn—she made it! She made it! She's ramping herself down to the flat!"

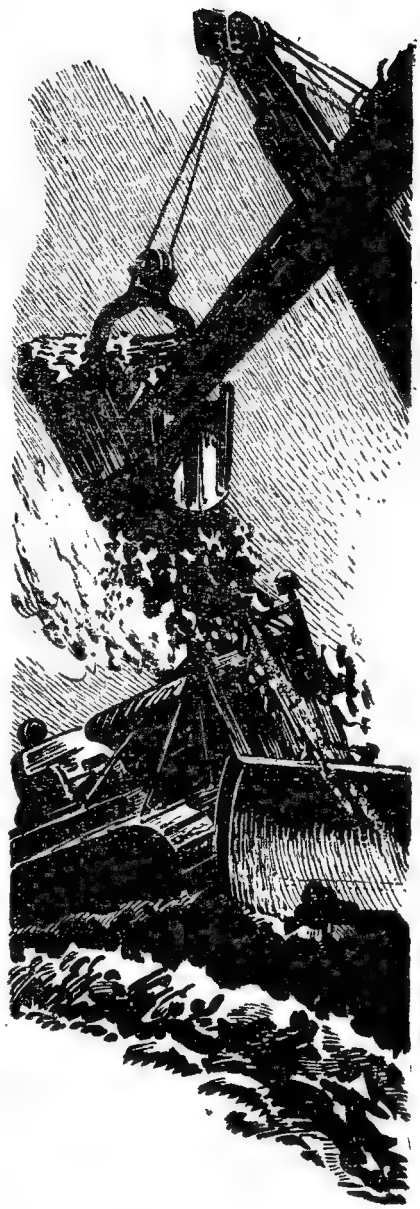
"She is—and she's cut us off from the bluff!"

The bulldozer, blade raised as high as it could possibly go, the hydraulic rod gleaming clean in the early light, freed herself of the last of her tremendous load, spun around and headed back upward, sinking her blade again. She made one more pass between them and the bluff, making a cut now far too wide for them to jump, particularly to the crumbly footing at the bluff's edge. Once down again, she turned to face their haven, now an isolated pillar of marl, and revved down, waiting.

"I never thought of this," said Kelly guiltily. "I knew we'd be safe from her ramping up, and I never thought she'd try it the other way!"

"Skip it. In the meantime, here we sit. What happens—do we wait up here until she idles out of fuel, or do we starve to death?"

"Oh, this won't be a siege, Tom. That thing's too much of a killer. Where's Al? I wonder if he's got



guts enough to make a pass near here with our tractor and draw her off?"

"He had just guts enough to take our tractor and head out," said Tom. "Didn't you know?"

"He took our—*what?*" Kelly looked out toward where they had left their machine the night before. It was gone. "Why the dirty little yellow rat!"

"No sense cussin'," said Tom steadily, interrupting what he knew was the beginning of some really flowery language. "What else could you expect?"

Daisy Etta decided, apparently, how to go about removing their splendid isolation. She uttered the snort of too-quick throttle, and moved into their peak with the corner of her blade, cutting out a huge swipe, undercutting the material over it so that it fell on her side and track as she passed. Eight inches disappeared from that side of their little plateau.

"Oh-oh. That won't do a-tall," said Tom.

"Fixin' to dig us down," said Kelly grimly. "Take her about twenty minutes. Tom, I say leave."

"It won't be healthy. You just got no idea how fast that thing can move now. Don't forget, she's a good deal more than she was when she had a man runnin' her. She can shift from high reverse to fifth speed forward like that"—he snapped his fingers—"and she can pivot faster'n you can blink and throw that blade just where she wants it."

The tractor passed under them, bellowing, and their little table was suddenly a foot shorter.

"Awright," said Kelly. "So what do you want to do? Stay here and let her dig the ground out from under our feet?"

"I'm just warning you," said Tom. "Now listen. We'll wait until she's taking a load. It'll take her a second to get rid of it when she knows we're gone. We'll split—she can't get both of us. You head out in the open, try to circle the curve of the bluff and get where you can climb it. Then come back over here to the cut. A man can scramble off a fourteen-foot cut faster'n any tractor ever built. I'll cut in close to the cut, down at the bottom. If she takes after you, I'll get clear all right. If she takes after me, I'll try to make the shovel and at least give her a run for her money. I can play hide an' seek in an' around and under that dipper-stick all day if she wants to play."

"Why me out in the open?"

"Don't you think those long laigs o' yours can outrun her in that distance?"

"Reckon they got to," grinned Kelly. "O.K., Tom."

They waited tensely. *Daisy Etta* backed close by, started another pass. As the motor blatted under the load, Tom said, "Now!" and they jumped. Kelly, catlike as always, landed on his feet. Tom, whose knees and ankles were black and blue with rope bruises, took two staggering steps and fell. Kelly scooped him to his feet as the doz-

er's steel prow came around the bank. Instantly she was in fifth gear and howling down at them. Kelly flung himself to the left and Tom to the right, and they pounded away, Kelly out toward the runway, Tom straight for the shovel. *Daisy Etta* let them diverge for a moment, keeping her course, trying to pursue both; then she evidently sized Tom up as the slower, for she swung toward him. The instant's hesitation was all Tom needed to get the little lead necessary. He tore up to the shovel, his legs going like pistons, and dived down between the shovel's tracks.

As he hit the ground, the big manganese-steel moldboard hit the right track of the shovel, and the impact set all forty-seven tons of the great machine quivering. But Tom did not stop. He scrabbled his way under the rig, stood up behind it, leaped and caught the sill of the rear window, clapped his other hand on it, drew himself up and tumbled inside. Here he was safe for the moment; the huge tracks themselves were higher than the Seven's blade could rise, and the floor of the cab was a good sixteen inches higher than the top of the track. Tom went to the cab door and peeped outside. The tractor had drawn off and was idling.

"Study away," gritted Tom, and went to the big Murphy Diesel. He unhurriedly checked the oil with the bayonet gauge, replaced it, took the governor cut-out rod from its rack and inserted it in the governor casing. He set the master throttle at the halfway mark, pulled up the starter-handle, twitched the cut-out. The motor spit a wad of blue smoke out of its hooded exhaust and caught. Tom put the rod back, studied the fuel-flow glass and pressure gauges, and then went to the door and looked out again. The Seven had not moved, but it was revving up and down in that uneven fashion it had shown up on the mesa. Tom had the extraordinary idea that it was gathering itself to spring. He slipped into the saddle, threw the master clutch. The big gears that half-filled the cab obediently began to turn. He kicked the brake-locks loose with his heels, let his feet rest lightly on the pedals as they rose.

Then he reached over his head and snapped back the throttle. As the Murphy picked up he grasped both hoist and swing levers and pulled them back. The engine howled; the two-yard bucket came up off the ground with a sudden jolt as the cold friction grabbed it. The big machine swung hard to the right; Tom snapped his hoist lever forward and checked the bucket's rise with his foot on the brake. He shoved the crowd lever forward; the bucket ran out to the end of its reach, and the heel of the bucket wiped right across the Seven's hood, taking with it the exhaust stack, muffler and all, and the pre-cleaner on the air intake. Tom cursed. He had figured on the machine's leaping backward. If it had, he would have smashed the cast-iron radiator core. But she had stood still, making a split-second decision.

Now she moved, though, and quickly. With that incredibly fast shifting, she leaped backwards and pivoted out of range before Tom could check the shovel's mad swing. The heavy swing-friction blocks smoked acridly as the machine slowed, stopped and swung back. Tom checked her as he was facing the Seven, hoisted his bucket a few feet, and rehauled, bringing it about halfway back, ready for anything. The four great dipper-teeth gleamed in the sun. Tom ran a practiced eye over cables, boom and dipper-stick, liking the black polish of crater compound on the sliding parts, the easy tension of well-greased cables and links. The huge machine stood strong, ready and profoundly subservient for all its brute power.

Tom looked searchingly at the Seven's ruined engine hood. The gaping end of the broken air-intake pipe stared back at him. "Aha!" he said. "A few cupfuls of nice dry marl down there'll give you something to chew on."

Keeping a wary eye on the tractor, he swung into the bank, dropped his bucket and plunged it into the marl. He crowded it deep, and the Murphy yelled for help but kept on pushing. At the peak of the load a terrific jar rocked him in the saddle. He looked back over his shoulder through the door and saw the Seven backing off again. She had run up and delivered a terrific punch to the counterweight at the back of the cab. Tom grinned tightly. She'd have to do better than that. There was nothing back there but eight or ten tons of solid steel. And he didn't much care at the moment whether or not she scratched his paint.

He swung back again, white marl running away on both sides of the heaped bucket. The shovel rode perfectly now, for a shovel is counterweighted to balance true when standing level with the bucket loaded. The hoist and swing frictions and the brake linings had heated and dried themselves of the night's condensation moisture, and she answered the controls in a way that delighted the operator in him. He handled the swing lever lightly, back to swing to the right, forward to swing to the left, following the slow dance the Seven had started to do, stepping warily back and forth like a fighter looking for an opening. Tom kept the bucket between himself and the tractor, knowing that she could not hurl a tool that was built to smash hard rock for twenty hours a day and like it.

Daisy Etta bellowed and rushed in. Tom snapped the hoist lever back hard, and the bucket rose, letting the tractor run underneath. Tom punched the bucket trip, and the great steel jaw opened, cascading marl down on the broken hood. The tractor's fan blew it back in a huge billowing cloud. The instant that it took Tom to check and dump was enough, however, for the tractor to dance back out of the way, for when he tried to drop it on the machine to smash the coiled injector tubes on top of the engine block, she was gone.

The dust cleared away, and the tractor moved in again, feinted to the left, then swung her blade at the bucket, which was just clear of the ground. Tom swung to meet her, her feint having gotten her in a little closer than he liked, and bucket met blade with a shower of sparks and a clank that could be heard for half a mile. She had come in with her blade high, and Tom let out a wordless shout as he saw that the A-frame brace behind the blade had caught between two of his dipper-teeth. He snatched at his hoist lever and the bucket came up, lifting with it the whole front end of the bulldozer.

Daisy Etta plunged up and down and her tracks dug violently into the earth as she raised and lowered her blade, trying to shake herself free. Tom rehauled, trying to bring the tractor in closer, for the boom was set too low to attempt to lift such a dead weight. As it was, the shovel's off track was trying its best to get off the ground. But the crowd and rehaul frictions could not handle her alone; they began to heat and slip.

Tom hoisted a little; the shovel's off track came up a foot off the ground. Tom cursed and let the bucket drop, and in an instant the dozer was free and running clear. Tom swung wildly at her, missed. The dozer came in on a long curve; Tom swung to meet her again, took a vicious swipe at her which she took on her blade. But this time she did not withdraw after being hit, but bored right in, carrying the bucket before her. Before Tom realized what she was doing, his bucket was around in front of the tracks and between them, on the ground. It was as swift and skillful a maneuver as could be imagined, and it left the shovel without the ability to swing as long as *Daisy Etta* could hold the bucket trapped between the tracks.

Tom crowded furiously, but that succeeded only in lifting the boom higher in the air, since there is nothing to hold a boom down but its own weight. Hoisting did nothing but make his frictions smoke and rev the engine down dangerously close to the stalling point.

Tom swore again and reached down to the cluster of small levers at his left. These were the gears. On this type of shovel, the swing lever controls everything except crowd and hoist. With the swing lever, the operator, having selected his gear, controls the travel—that is, power to the tracks—in forward and reverse; booming up and booming down; and swinging. The machine can do only one of these things at a time. If she is in travel gear, she cannot swing. If she is in swing gear, she cannot boom up or down. Not once in years of operating would this inability bother an operator; now, however, nothing was normal.

Tom pushed the swing gear control down and pulled up on the travel. The clutches involved were jaw clutches, not frictions, so that he had to throttle down to an idle before he could make the castellations mesh. As the Murphy revved

down, *Daisy Etta* took it as a signal that something could be done about it, and she shoved furiously into the bucket. But Tom had all controls in neutral and all she succeeded in doing was to dig herself in, her sharp new cleats spinning deep into the dirt.

Tom set his throttle up again and shoved the swing lever forward. There was a vast crackling of drive chains; and the big tracks started to turn.

Daisy Etta had sharp cleats; her pads were twenty inches wide and her tracks were fourteen feet long, and there were fourteen tons of steel on them. The shovel's big flat pads were three feet wide and twenty feet long, and forty-seven tons aboard. There was simply no comparison. The Murphy bellowed the fact that the work was hard, but gave no indications of stalling. *Daisy Etta* performed the incredible feat of shifting into a forward gear while she was moving backwards, but it did her no good. Round and round her tracks went, trying to drive her forward, gouging deep; and slowly and surely she was forced backward toward the cut wall by the shovel.

Tom heard a sound that was not part of a straining machine; he looked out and saw Kelly up on top of the cut, smoking, swinging his feet over the edge, making punching motions with his hands as if he had a ringside seat at a big fight—which he certainly had.

Tom now offered the dozer little choice. If she did not turn aside before him, she would be borne back against the bank and her fuel tank crushed. There was every possibility that, having her pinned there, Tom would have time to raise his bucket over her and smash her to pieces. And if she turned before she was forced against the bank, she would have to free Tom's bucket. This she had to do.

The Murphy gave him warning, but not enough. It crooned as load came off, and Tom knew then that the dozer was shifting into a reverse gear. He whipped the hoist lever back, and the bucket rose as the dozer backed away from him. He crowded it out and let it come smashing down—and missed. For the tractor danced aside—and while he was in travel gear he could not swing to follow it. *Daisy Etta* charged then, put on track on the bank and went over almost on her beam-ends, throwing one end of her blade high in the air. So totally unexpected was it that Tom was quite unprepared. The tractor flung itself on the bucket, and the cutting edge of the blade dropped between the dipper teeth. This time there was the whole weight of the tractor to hold it there. There would be no way for her to free herself—but at the same time she had trapped the bucket so far out from the center pin of the shovel that Tom couldn't hoist without overbalancing and turning the monster over.

Daisy Etta ground away in reverse, dragging the bucket out until it was checked by the bumper-blocks. Then she began to crab sideways, up against the bank and when Tom tried tentatively to re-

haul, she shifted and came right with him, burying one whole end of her blade deep into the bank.

Stalemate. She had hung herself up on the bucket, and she had immobilized it. Tom tried to rehaul, but the tractor's anchorage in the bank was too solid. He tried to swing, to hoist. All the overworked frictions could possibly give out was smoke. Tom grunted and throttled to an idle, leaned out the window. *Daisy Etta* was idling too, loudly without her muffler, the stackless exhaust giving out an ugly flat sound. But after the roar of the two great motors the partial silence was deafening.

Kelly called down, "Double knockout, hey?"

"Looks like it. What say we see if we can't get close enough to her to quiet her down some?"

Kelly shrugged. "I dunno. If she's really stopped herself, it's the first time. I respect that rig, Tom. She wouldn't have got herself into that spot if she didn't have an ace up her sleeve."

"Look at her, man! Suppose she was a civilized bulldozer and you had to get her out of there. She can't raise her blade high enough to free it from those dipper-teeth, y'know. Think you'd be able to do it?"

"It might take several seconds," Kelly drawled. "She's sure high and dry."

"O.K., let's spike her guns."

"Like what?"

"Like taking a bar and prying out her tubing." He referred to the coiled brass tubing that carried the fuel, under pressure, from the pump to the injectors. There were many feet of it, running from the pump reservoir, stacked in expansion coils over the cylinder head.

As he spoke *Daisy Etta*'s idle burst into that maniac revving up and down characteristic of her.

"What do you know!" Tom called above the racket. "Eavesdropping!"

Kelly slid down the cut, stood up on the track of the shovel and poked his head in the window. "Well, you want to get a bar and try?"

"Let's go!"

Tom went to the toolbox and pulled out the pinch bar that Kelly used to replace cables on his machine, and swung to the ground. They approached the tractor warily. She revved up as they came near, began to shudder. The front end rose and dropped and the tracks began to turn as she tried to twist out of the vise her blade had dropped into.

"Take it easy, sister," said Tom. "You'll just bury yourself. Set still and take it, now, like a good girl. You got it comin'."

"Be careful," said Kelly. Tom hefted the bar and laid a hand on the fender.

The tractor literally shivered, and from the rubber hose connection at the top of the radiator, a blinding stream of hot water shot out. It fanned and caught them both full in the face. They staggered back, cursing.

"You O.K., Tom?" Kelly gasped

a moment later. He had got most of it across the mouth and cheek. Tom was on his knees, his shirt tail out, blotting at his face.

"My eyes . . . oh my eyes—"

"Let's see!" Kelly dropped down beside him and took him by the wrists, gently removing Tom's hands from his face. He whistled. "Come on," he gritted. He helped Tom up and led him away a few feet. "Stay here," he said hoarsely. He turned, walked back toward the dozer, picking up the pinchbar. "You dirty —!" he yelled, and flung it like a javelin at the tube coils. It was a little high. It struck the ruined hood, made a deep dent in the metal. The dent promptly inverted with a loud *thung-g-g-!* and flung the bar back at him. He ducked; it whistled over his head and caught Tom in the calves of his legs. He went down like a poled ox, but staggered to his feet again.

"Come on!" Kelly snarled, and taking Tom's arm, hustled him around the turn of the cut. "Sit down! I'll be right back."

"Where you going? Kelly—be careful!"

"Careful and how!"

Kelly's long legs ate up the distance back to the shovel. He swung into the cab, reached back over the motor and set up the master throttle all the way. Stepping up behind the saddle, he opened the running throttle and the Murphy howled. Then he hauled back on the hoist lever until it knuckled in, turned and leaped off the machine in one supple motion.

The hoist drum turned and took up slack; the cable straightened as it took the strain. The bucket stirred under the dead weight of the bulldozer that rested on it; and slowly, then, the great flat tracks began to lift their rear ends off the ground. The great obedient mass of machinery teetered forward on the tips of her tracks, the Murphy revved down and under the incredible load, but it kept the strain. A strand of the two-part hoist cable broke and whipped around, singing; and then she was balanced—overbalanced—

And the shovel had hauled herself right over and had fallen with an Earth-shaking crash. The boom, eight tons of solid steel, clanged down onto the blade of the bulldozer, and lay there, crushing it down tightly onto the imprisoning row of dipper-teeth.

Daisy Etta sat there, not trying to move now, racing her motor impotently. Kelly strutted past her, thumbing his nose, and went back to Tom.

"Kelly! I thought you were never coming back! What happened?"

"Shovel pulled herself over on her nose."

"Good boy! Fall on the tractor?"

"Nup. But the boom's laying across the top of her blade. Caught like a rat in a trap."

"Better watch out the rat don't chew its leg off to get out," said Tom, drily. "Still runnin', is she?"

"Yep. But we'll fix that in a hurry."

"Sure. Sure. How?"

"How? I dunno. Dynamite, maybe. How's the optics?"

Tom opened one a trifle and grunted. "Rough. I can see a little, though. My eyelids are parboiled, mostly. Dynamite, you say? Well—"

Tom sat back against the bank and stretched out his legs. "I tell you, Kelly, I been too blessed busy these last few hours to think much, but there's one thing that keeps comin' back to me—somethin' I was mullin' over long before the rest of you guys knew anything was up at all, except that Rivera had got hurt in some way I wouldn't tell you all about. But I don't reckon you'll call me crazy if I open my mouth now and let it all run out?"

"From now on," Kelly said fervently, "nobody's crazy. After this I'll believe anything."

"O.K. Well, about that tractor. What do you suppose has got into her?"

"Search me. I dunno."

"No—don't say that. I just got an idea we can't stop at 'I dunno'. We got to figure all the angles on this thing before we know just what to do about it. Let's just get this thing lined up. When did it start? On the mesa. How? Rivera was opening an old building with the Seven. This thing came out of there. Now here's what I'm getting at. We can dope these things out about it: It's intelligent. It can only get into a machine and not into a man. It—"

"What about that? How do you know it can't?"

"Because it had the chance to and didn't. I was standing right by the opening when it kited out. Rivera was upon the machine at the time. It didn't directly harm either of us. It got into the tractor, and the tractor did. By the same token, it can't hurt a man when it's out of a machine, but that's all it wants to do when it's in one. O.K.?

"To get on: once it's in one machine it can't get out again. We know that because it had plenty of chances and didn't take them. That scuffle with the dipper-stick, f'r instance. My face woulda been plenty red if it had taken over the shovel—and you can bet it would have if it could."

"I got you so far. But what are we going to do about it?"

"That's the thing. You see, I don't think it's enough to wreck the tractor. We might burn it, blast it, take whatever it was that got into it up on the mesa."

"That makes sense. But I don't see what else we can do than just break up the dozer. We haven't got a line on actually what the thing is."

"I think we have. Remember I asked you all those screwy questions about the arc that killed Peebles. Well, when that happened, I recollected a flock of other things. One—when it got out of that hole up there, I smelled that smell that you notice when you're welding; sometimes when lightning strikes real close."

"Ozone," said Kelly.

"Yeah—ozone. Then, it likes metal, not flesh. But most of all, there was that arc. Now, that was absolutely screwy. You know as

well as I do—better—that an arc generator simply don't have the push to do a thing like that. It can't kill a man, and it can't throw an arc no fifty feet. But it did. An' that's why I asked you if there could be something—a field, or some such—that could *suck* current out of a generator, all at once, faster than it could flow. Because this thing's electrical; it fits all around."

"Electronic," said Kelly doubtfully, thoughtfully.

"I wouldn't know. Now then. When Peebles was killed, a funny thing happened. Remember what Chub said? The Seven moved back—straight back, about thirty feet, until it bumped into a roadroller that was standing behind it. It did that with no fuel in the starting engine—without even using the starting engine, for that matter—and with the compression valves locked open!

"Kelly, that thing in the dozer can't do much, when you come right down to it. It couldn't fix itself up after that joy-ride on the mesa. It can't make the machine do too much more than the machine can do ordinarily. What it actually can do, seems to me, is to make a spring push instead of pull, like the control levers, and make a fitting slip when it's supposed to hold, like the ratchet on the throttle lever. It can turn a shaft, like the way it cranks its own starting motor. But if it was so all-fired high-powered, it wouldn't have to use the starting motor! The absolute biggest job it's done so far, seems to me, was when it walked back from that welding machine when Peebles got his. Now, why did it do that just then?"

"Reckon it didn't like the brimstone smell, like it says in the Good Book," said Kelly sourly.

"That's pretty close, seems to me. Look, Kelly—this thing *feels* things. I mean, it can get sore. If it couldn't it never woulda kept driving in at the shovel like that. It can think. But if it can do all those things, then it can be *scared!*

"Scared? Why should it be scared?"

"Listen. Something went on in that thing when the arc hit it. What's that I read in a magazine once about heat—something about molecules runnin' around with their heads cut off when they got hot?"

"Molecules do. They go into rapid motion when heat is applied. But—"

"But nothin'. That machine was hot for four hours after that. But she was hot in a funny way. Not just around the place where the arc hit, like as if it was a welding arc. But hot all over—from the moldboard to the fuel-tank cap. Hot everywhere. And just as hot behind the final drive housings as she was at the top of the blade where the poor guy put his hand.

"And look at this." Tom was getting excited, as his words crystallized his ideas. "She was scared—scared enough to back off from that welder, putting everything she could into it, to get back from that welding machine. And after that, she was sick. I say that because in the whole time she's had that

whatever-ya-call-i t in her, she's never been near men without trying to kill them, except for those two days after the arc hit her. She had juice enough to start herself when Dennis came around with the crank, but she still needed someone to run her till she got her strength back."

"But why didn't she turn and smash up the welder when Dennis took her?"

"One of two things. She didn't have the strength, or she didn't have the guts. She was scared, maybe, and wanted out of there, away from that thing."

"But she had all night to go back for it!"

"Still scared. Or . . . oh, *that's* it! She had other things to do first. Her main idea is to kill men—there's no other way you can figure it. It's what she was built to do. Not the tractor—they don't build 'em sweeter'n that machine: but the thing that's runnin' it."

"What *is* that thing?" Kelly mused. "Coming out of that old building—temple—what have you—how old is it? How long was it there? What kept it in there?"

"What kept it in there was some funny gray stuff that lined the inside of the buildin'," said Tom. "It was like rock, an' it was like smoke.

"It was a color that scared you to look at it, and it gave Rivera and me the creeps when we got near it. Don't ask me what it was. I went up there to look at it, and it's gone. Gone from the building, anyhow. There was a little lump of it on the ground. I don't know whether that was a hunk of it, or all of it rolled up into a ball. I get the creeps again thinkin' about it."

Kelly stood up. "Well, the heck with it. We been beatin' our gums up here too long anyhow. There's just enough sense in what you say to make me want to try something nonsensical, if you see what I mean. If that welder can sweat the Ol' Nick out of that tractor, I'm on. Especially from fifty feet away. There should be a Dumptor around here somewhere; let's move from here. Can you navigate now?"

"Reckon so, a little." Tom rose and together they followed the cut until they came on the Dumptor. They climbed on, cranked it up and headed toward camp.

About half way there Kelly looked back, gasped, and putting his mouth close to Tom's ear, bellowed against the scream of the motor, "Tom! 'Member what you said about the rat in the trap biting off a leg?"

Tom nodded.

"Well, *Daisy* did too! She's left her blade an' pushbeams an' she's followin' us in!"

They howled into the camp, gasping against the dust that followed when they pulled up by the welder.

Kelly said, "You cast around and see if you can find a drawpin to hook that rig up to the Dumptor with. I'm goin' after some water an' chow!"

Tom grinned. Imagine old Kelly forgetting that a Dumptor had no drawbar! He groped around to a

toolbox, peering out of the narrow slit beneath swollen lids, felt behind it and located a shackle. He climbed up on the Dumptor, turned it around and backed up to the welding machine. He passed the shackle through the ring at the end of the steering tongue of the welder, screwed in the pin and dropped the shackle over the front towing hook of the Dumptor. A dumptor being what it is, having no real front and no real rear, and direct reversing gears in all speeds, it was no trouble to drive it "backwards" for a change.

Kelly came pounding back, out of breath. "Fix it? Good. Shackle? No drawbar! *Daisy*'s closin' up fast; I say let's take the beach. We'll be concealed until we have a good lead out o' this pocket, and the going's pretty fair, long as we don't bury this jalopy in the sand."

"Good," said Tom as they climbed on and he accepted an open tin of K. "Only go easy; bump around too much and the welder'll slip off the hook. An' I somehow don't want to lose it just now."

They took off, zooming up the beach. A quarter of a mile up, they sighted the Seven across the flat. It immediately turned and took a course that would intercept them.

"Here she comes," shouted Kelly, and stepped down hard on the accelerator. Tom leaned over the back of the seat, keeping his eye on their tow. "Hey! Take is easy! Watch it!

"Hey!

"Hey!"

But it was too late. The tongue of the welding machine responded to that one bump too many. The shackle jumped up off the hook, the welder lurched wildly, slewed hard to the left. The tongue dropped to the sand and dug in; the machine rolled up on it and snapped it off, finally stopped, leaning crazily askew. By a miracle it did not quite turn over.

Kelly tramped on the brakes and both their heads did their utmost to snap off their shoulders. They leaped off and ran back to the welder. It was intact, but towing it was now out of the question.

"If there's going to be a showdown, it's gotta be here."

The beach here was about thirty yards wide, the sand almost level, and undercut banks of sawgrass forming the landward edge in a series of little hummocks and headlands. While Tom stayed with the machine, testing starter and generator contacts, Kelly walked up one of the little mounds, stood up on it and scanned the beach back the way he had come. Suddenly he began to shout and wave his arms.

"What's got into you?"

"It's Al!" Kelly called back. "With the pan tractor!"

Tom dropped what he was doing, and came to stand beside Kelly. "Where's the Seven? I can't see."

"Turned on the beach and followin' our track. Al! Al! you little skunk, c'mere!"

Tom could now dimly make out the pan tractor cutting across directly toward them and the beach.

"He don't see *Daisy Etta,*" remarked Kelly disgustedly, "or he'd sure be headin' the other way."

Fifty yards away Al pulled up and throttled down. Kelly shouted and waved to him. Al stood up on the machine, cupped his hands around his mouth. "Where's the Seven?"

"Never mind that! Come here with that tractor!"

Al stayed where he was. Kelly cursed and started out after him.

"You stay away from me," he said when Kelly was closer.

"I ain't got time for you now," said Kelly. "Bring that tractor down to the beach."

"Where's that *Daisy Etta?*" Al's voice was oddly strained.

"Right behind us." Kelly tossed a thumb over his shoulder. "On the beach."

Al's pop eyes clicked wide almost audibly. He turned on his heel and jumped off the machine and started to run. Kelly uttered a wordless syllable that was somehow more obscene than anything else he had ever uttered, and vaulted into the seat of the machine. "Hey!" he bellowed after Al's rapidly diminishing figure. "You're runnin' right into her." Al appeared not to hear, but went pelting down the beach.

Kelly put her into fifth gear and poured on the throttle. As the tractor began to move he whacked out the master clutch, snatched the overdrive lever back to put her into sixth, rammed the clutch in again, all so fast that she did not have time to stop rolling. Bucking and jumping over the rough ground the fast machine whined for the beach.

Tom was fumbling back to the welder, his ears telling him better than his eyes how close the Seven was—for she was certainly no nightingale, particularly without her exhaust stack. Kelly reached the machine as he did.

"Get behind it," snapped Tom. "I'll jamp the tierod with the shackle, and you see if you can't bunt her up into that pocket between those two hummocks. Only take it easy—you don't want to tear up that generator. Where's Al?"

"Don't ask me. He run down the beach to meet *Daisy.*"

"He *what?*"

The whine of the two-cycle drowned out Kelly's answer, if any. He got behind the welder and set his blade against it. Then in a low gear, slipping his clutch a little, he slowly nudged the machine toward the place Tom had indicated. It was a little hollow in between two projecting banks. The surf and the high-tide mark dipped inland here to match it; the water was only a few feet away.

Tom raised his arm and Kelly stopped. From the other side of the projecting shelf, out of their sight now, came the flat roar of the Seven's exhaust. Kelly sprang off the tractor and went to help Tom, who was furiously throwing out coils of cable from the rack back of the welder. "What's the game?"

"We got to ground that Seven some way," panted Tom. He threw the last bit of cable out to clear it

of kinks and turned to the panel. "How was it—about sixty volts and the amperage on 'special application'?" He spun the dials, pressed the starter button. The motor responded instantly. Kelly scooped up ground clamp and rod holder and tapped them together. The solenoid governor picked up the load and the motor hummed as a good live spark took the jump.

"Good," said Tom, switching off the generator. "Come on, Lieutenant General Electric, figure me out a way to ground that maverick."

Kelly tightened his lips, shook his head. "I dunno—unless somebody actually clamps this thing on her."

"No, boy, can't do that. If one of us gets killed—"

Kelly tossed the ground clamp idly, his lithe body taut. "Don't give me that, Tom. You know I'm elected because you can't see good enough yet to handle it. You know you'd do it if you could. You—"

He stopped short, for the steadily increasing roar of the approaching Seven had stopped, was blatting away now in that extraordinary irregular throttling that *Daisy Etta* affected.

"Now, what's got into her?"

Kelly broke away and scrambled up the bank. "Tom!" he gasped. "Tom—come up here!"

Tom followed, and they lay side by side, peering out over the top of the escarpment at the remarkable tableau.

Daisy Etta was standing on the beach, near the water, not moving. Before her, twenty or thirty feet away, stood Al Knowles, his arms out in front of him, talking a blue streak. *Daisy* made far too much racket for them to hear what he was saying.

"Do you reckon he's got guts enough to stall her off for us?" said Tom.

"If he has, it's the queerest thing that's happened yet on this old island," Kelly breathed, "an' that's saying something."

The Seven revved up till she shook, and then throttled back. She ran down so low then that they thought she had shut herself down, but she caught on the last two revolutions and began to idle quietly. And then they could hear.

Al's voice was high, hysterical. "—I come t' he'p you, I come t' he'p you, don' kill me, I'll he'p you —" He took a step forward; the dozer snorted and he fell to his knees. "I'll wash you an' grease you and change yo' ile," he said in a high singsong.

"The guy's not human," said Kelly wonderingly.

"He ain't housebroke either," Tom chuckled.

"—lemme he'p you. I'll fix you when you break down. I'll he'p you kill those other guys—"

"She don't need any help!" said Tom.

"The louse," growled Kelly. "The rotten little double-crossing polecat!" He stood up. "Hey, you Al! Come out o' that. I mean now! If she don't get you I will, if you don't move."

Al was crying now. "Shut up!" he screamed. "I know who's bawss

hereabouts, an' so do you!" He pointed at the tractor. "She'll kill us all iff'n we don't do what she wants!" He turned back to the machine. "I'll k-kill 'em fo' you. I'll wash you and shine you up and f-fix yo' hood. I'll put yo' blade back on. . . ."

Tom reached out and caught Kelly's leg as the tall man started out, blind mad. "Git back here," he barked. "What you want to do—get killed for the privilege of pinnin' his ears back?"

Kelly subsided and came back, threw himself down beside Tom, put his face in his hands. He was quivering with rage.

"Don't take on so," Tom said. "The man's plumb loco. You can't argue with him any more'n you can with *Daisy*, there. If he's got to get his, *Daisy'll* give it to him."

"Aw Tom, it ain't that. I knew he ain't worth it, but I can't sit up here and watch him get himself killed. I can't, Tom."

Tom thumped him on the shoulder, because there were simply no words to be said. Suddenly he stiffened, snapped his fingers.

"There's our ground," he said urgently, pointing seaward. "The water—the wet beach where the surf runs. If we can get our ground clamp out there and her somewhere near it—"

"Ground the pan tractor. Run it out into the water. It ought to reach—partway, anyhow."

"That's it—c'mon."

They slid down the bank, snatched up the ground clamp, attached it to the frame of the pan tractor.

"I'll take it," said Tom, and as Kelly opened his mouth, Tom shoved him back against the welding machine. "No time to argue," he snapped, swung on to the machine, slapped her in gear and was off. Kelly took a step toward the tractor, and then his quick eye saw a bight of the ground cable about to foul a wheel of the welder. He stooped and threw it off, spread out the rest of it so it would pay off clear. Tom, with the incredible single-mindedness of the trained operator, watched only the black line of the trailing cable on the sand behind him. When it straightened, he stopped. The front of the tracks were sloshing in the gentle surf. He climbed off the side away from the Seven and tried to see. There was movement, and the growl of her motor now running at a bit more than idle, but he could not distinguish much.

Kelly picked up the rod-holder and went to peer around the head of the protruding bank. Al was on his feet, still crooning hysterically, sidling over toward *Daisy Etta*. Kelly ducked back, threw the switch on the arc generator, climbed the bank and crawled along through the sawgrass paralleling the beach until the holder in his hand tugged and he knew he had reached the end of the cable. He looked out at the beach; measured carefully with his eye the arc he would travel if he left his position and, keeping the cable taut, went out on the beach. At no point would he come

within seventy feet of the possessed machine, let alone fifty. She had to be drawn in closer. And she had to be maneuvered out to the wet sand, or in the water—

Al Knowles, encouraged by the machine's apparent decision not to move approached, though warily, and still running off at the mouth. "—we'll kill 'em off an' then we'll keep it a secret and th' bahges'll come an' take us offen th' island and we'll go to anothah job an' kill us lots mo' . . . an' when yo' tracks git dry an' squeak we'll wet 'em up with blood, and you'll be rightly king o' th' hill . . . look yondah, look yondah, *Daisy Etta,* see them theah, by the otheh tractuh, theah they are, kill 'em, *Daisy,* kill 'em, *Daisy,* an' lemme he'p . . . heah me. *Daisy,* heah me, say you heah me—" and the motor roared in response. Al laid a timid hand on the radiator guard, leaning far over to do it, and the tractor still stood there grumbling but not moving. Al stepped back, motioned with his arm, began to walk off slowly toward the pan tractor, looking backwards as he did so like a man training a dog. "C'mon, c'mon, theah's one theah, le's *kill'm, kill'm, kill'm. . .* "

And with a snort the tractor revved up and followed.

Kelly licked his lips without effect because his tongue was dry, too. The madman passed him, walking straight up the center of the beach, and the tractor, now no longer a bulldozer, followed him; and there the sand was bone dry, sun-dried, dried to powder. As the tractor passed him, Kelly got up on all fours, went over the edge of the bank onto the beach, crouched there.

Al crooned, "I love ya, honey, I love ya, 'deed I do—"

Kelly ran crouching, like a man under machine-gun fire, making himself as small as possible and feeling as big as a barn door. The torn-up sand where the tractor had passed was under his feet now; he stopped, afraid to get too much closer, afraid that a weakened, badly grounded arc might leap from the holder in his hand and serve only to alarm and infuriate the thing in the tractor. And just then Al saw him.

"There!" he screamed; and the tractor pulled up short. "Behind you! Get'm, *Daisy! Kill'm, kill'm, kill'm.*"

Kelly stood up almost wearily, fury and frustration too much to be borne. "In the water," he yelled, because it was what his whole being wanted. "Get'er in the water! Wet her tracks, Al!"

"*Kill'm, kill'm—*"

As the tractor started to turn, there was a commotion over by the pan tractor. It was Tom, jumping, shouting, waving his arms, swearing. He ran out from behind his machine, straight at the Seven. *Daisy Etta's* motor roared and she swung to meet him, Al barely dancing back out of the way. Tom cut sharply, sand spouting under his pumping feet, and ran straight into the water. He went out to about waist deep, suddenly disappeared. He surfaced, spluttering, still try-

ing to shout. Kelly took a better grip on his rod holder and rushed.

Daisy Etta, in following Tom's crazy rush, had swung in beside the pan tractor, not fifteen feet away; and she, too, was now in the surf. Kelly closed up the distance as fast as his long legs would let him; and as he approached to within that crucial fifty feet, Al Knowles hit him.

Al was frothing at the mouth, gibbering. The two men hit full tilt; Al's head caught Kelly in the midriff as he missed a straightarm, and the breath went out of him in one great *whoosh!* Kelly went down like tall timber, the whole world turned to one swirling red-gray haze. Al flung himself on the bigger man, clawing, smacking, too berserk to ball his fists.

"Ah'm go' to kill you," he gurgled. "She'll git one, I'll git t'other, an' then she'll know—"

Kelly covered his face with his arms, and as some wind was sucked at last into his laboring lungs, he flung them upward and sat up in one mighty surge. Al was hurled upward and to one side, and as he hit the ground Kelly reached out a long arm, and twisted his fingers into the man's coarse hair, raised him up, and came across with his other fist in a punch that would have killed him had it landed square. But Al managed to jerk to one side enough so that it only amputated a cheek. He fell and lay still. Kelly scrambled madly around in the sand for his welding-rod holder, found it and began to run again. He couldn't see Tom at all now, and the Seven was standing in the surf, moving slowly from side to side, backing out, ravening. Kelly held the rod-clamp and its trailing cable blinding before him and ran straight at the machine. And then it came—that thin, soundless bolt of energy. But this time it had its full force, for poor old Peebles' body had not been the ground that this swirling water offered. *Daisy Etta* literally leaped backwards toward him, and the water around her tracks spouted upward in hot steam. The sound of her engine ran up and up, broke, took on the rhythmic, uneven beat of a swing drummer. She threw herself from side to side like a cat with a bag over its head. Kelly stepped a little closer, hoping for another bolt to come from the clamp in his hand, but there was none, for—

"The circuit breaker!" cried Kelly.

He threw the holder up on the deck plate of the Seven in front of the seat, and ran across the little beach to the welder. He reached behind the switchboard, got his thumb on the contact hinge and jammed it down.

Daisy Etta leaped again, and then again, and suddenly her motor stopped. Heat in turbulent waves blurred the air over her. The little gas tank for the starting motor went out with a cannon's roar, and the big fuel tank, still holding thirty-odd gallons of Diesel oil followed. It puffed itself open rather than exploded, and threw a great

curtain of flame over the ground behind the machine. Motor or no motor, then, Kelly distinctly saw the tractor shudder convulsively. There was a crawling movement of the whole frame, a slight wave of motion away from the fuel tank, approaching the front of the machine, and moving upward from the tracks. It culminated in the crown of the radiator core, just in front of the radiator cap; and suddenly an area of six or seven square inches literally *blurred* around the edges. For a second, then, it was normal, and finally it slumped molten, and liquid metal ran down the sides, throwing out little sparks as it encountered what was left of the charred paint. And only then was Kelly conscious of agony in his left hand. He looked down. The welding machine's generator had stopped, though the motor was still turning, having smashed the friable coupling on its drive shaft. Smoke poured from the generator, which had become little more than a heap of slag. Kelly did not scream, though, until he looked and saw what had happened to his hand—

When he could see straight again, he called for Tom, and there was no answer. At last he saw something out in the water, and plunged in after it. The splash of cold salt water on his left hand he hardly felt, for the numbness of shock had set in. He grabbed at Tom's shirt with his good hand, and then the ground seemed to pull itself out from under his feet. That was it, then—a deep hole right off the beach. The Seven had run right to the edge of it, had kept Tom there out of his depth and—

He flailed wildly, struck out for the beach, so near and so hard to get to. He gulped a stinging lungful of brine, and only the lovely shock of his knee striking solid beach kept him from giving up to the luxury of choking to death. Sobbing with effort, he dragged Tom's dead weight inshore and clear of the surf. It was then that he became conscious of a child's shrill weeping; for a mad moment he thought it was he himself, and then he looked and saw that it was Al Knowles. He left Tom and went over to the broken creature.

"Get up, you," he snarled. The weeping only got louder. Kelly rolled him over on his back—he was quite unresisting—and belted him back and forth across the mouth until Al began to choke. Then he hauled him to his feet and led him over to Tom.

"Kneel down, scum. Put one of your knees between his knees." Al stood still. Kelly hit him again and he did as he was told.

"Put your hand on his lower ribs. There. O. K. Lean, you rat. Now sit back." He sat down, holding his left wrist in his right hand, letting the blood drop from the ruined hand. "Lean. Hold it —sit back. Lean. Sit. Lean. Sit."

Soon Tom sighed and began to vomit weakly. and after that he was all right.

This is the story of *Daisy Etta,* the bulldozer that went mad and

had a life of its own, and not the story of the flat-top *Marokuru* of the Imperial Japanese Navy, which has been told elsewhere. But there is a connection. You will remember how the *Marokuru* was cut off from its base by the concentrated attack on Truk, how it slipped far to the south and east and was sunk nearer to our shores than any other Jap warship in the whole course of the war. And you will remember how a squadron of five planes, having been separated by three vertical miles of water from their flight deck, turned east with their bombloads and droned away for a suicide mission. You read that they bombed a minor airfield in the outside of Panama's far-flung defenses, and all hands crashed in the best sacrificial fashion.

Well, that was no airfield, no matter what it might have looked like from the air. It was simply a roughly graded runway, white marl against brown scrub-grass.

The planes came two days after the death of *Daisy Etta,* as Tom and Kelly sat in the shadow of the pile of fuel drums, down in the coolth of the swag that *Daisy* had dug there to fuel herself. They were poring over paper and pencil, trying to complete the impossible task of making a written statement of what had happened on the island, and why they and their company had failed to complete their contract. They had found Chub and Harris, and had buried them next to the other three. Al Knowles was tied up in the camp, because they had heard him raving in his sleep, and it seemed he could not believe that *Daisy* was dead and he still wanted to go around killing operators for her. They knew that there must be an investigation, and they knew just how far their story would go; and having escaped a monster like *Daisy Etta,* life was far too sweet for them to want to be shot for sabotage. And murder.

The first stick of bombs struck three hundred yards behind them at the edge of the camp, and at the same instant a plane whistled low over their heads, and that was the first they knew about it. They ran to Al Knowles and untied his feet and the three of them headed for the bush. They found refuge, strangely enough, inside the mound where *Daisy Etta* had first met her possessor.

"Bless their black little hearts," said Kelly as he and Tom stood on the bluff and looked at the flaming wreckage of a camp and five medium bombers below them. And he took the statement they had been sweating out and tore it across.

"But what about him?" said Tom, pointing at Al Knowles, who was sitting on the ground, playing with his fingers. "He'll still spill the whole thing, no matter if we do try to blame it all on the bombing."

"What's the matter with that?" said Kelly.

Tom thought a minute, then grinned. "Why, nothing! That's just the sort of thing they'll expect from him!"

THE END.

Desertion

by CLIFFORD D. SIMAK

***Exploring** a really alien planet is almost impossible—it takes a form adapted to the conditions of the planet. But even when men were given that properly adapted form, they didn't come back—*

Illustrated by Williams

Four men, two by two, had gone into the howling maelstrom that was Jupiter and had not returned. They had walked into the keening gale—or rather, they had loped, bellies low against the ground, wet sides gleaming in the rain.

For they did not go in the shape of men.

Now the fifth man stood before the desk of Kent Fowler, head of Dome No. 3, Jovian Survey Commission.

Under Fowler's desk, old Towser scratched a flea, then settled down to sleep again.

Harold Allen, Fowler saw with a sudden pang, was young—too young. He had the easy confidence of youth, the straight back and

straight eyes, the face of one who never had known fear. And that was strange. For men in the domes of Jupiter did know fear—fear and humility. It was hard for Man to reconcile his puny self with the mighty forces of the monstrous planet.

"You understand," said Fowler, "that you need not do this. You understand that you need not go."

It was formula, of course. The other four had been told the same thing, but they had gone. This fifth one, Fowler knew, would go too. But suddenly he felt a dull hope stir within him that Allen wouldn't go.

"When do I start?" asked Allen.

There was a time when Fowler might have taken quiet pride in that answer, but not now. He frowned briefly.

"Within the hour," he said.

Allen stood waiting, quietly.

"Four other men have gone out and have not returned," said Fowler. "You know that, of course. We want you to return. We don't want you going off on any heroic rescue expedition. The main thing, the only thing, is that you come back, that you prove man can live in a Jovian form. Go to the first survey stake, no farther, then come back. Don't take any chances. Don't investigate anything. Just come back."

Allen nodded. "I understand all that."

"Miss Stanley will operate the converter," Fowler went on. "You need have no fear on that particular point. The other men were converted without mishap. They left the converter in apparently perfect condition. You will be in thoroughly competent hands. Miss Stanley is the best qualified conversion operator in the Solar System. She has had experience on most of the other planets. That is why she's here."

Allen grinned at the woman and Fowler saw something flicker across Miss Stanley's face—something that might have been pity, or rage—or just plain fear. But it was gone again and she was smiling back at the youth who stood before the desk. Smiling in that prim, schoolteacherish way she had of smiling, almost as if she hated herself for doing it.

"I shall be looking forward," said Allen, "to my conversion."

And the way he said it, he made it all a joke, a vast, ironic joke.

But it was no joke.

It was serious business, deadly serious. Upon these tests, Fowler knew, depended the fate of men on Jupiter. If the tests succeeded, the resources of the giant planet would be thrown open. Man would take over Jupiter as he already had taken over the other smaller planets. And if they failed—

If they failed, Man would continue to be chained and hampered by the terrific pressure, the greater force of gravity, the weird chemistry of the planet. He would continue to be shut within the domes, unable to set actual foot upon the planet, unable to see it with direct, unaided vision, forced to rely upon the awkward tractors and the tele-

visor, forced to work with clumsy tools and mechanisms or through the medium of robots that themselves were clumsy.

For Man, unprotected and in his natural form, would be blotted out by Jupiter's terrific pressure of fifteen thousand pounds per square inch, pressure that made Terrestrial sea bottoms seem a vacuum by comparison.

Even the strongest metal Earthmen could devise couldn't exist under pressure such as that, under the pressure and the alkaline rains that forever swept the planet. It grew brittle and flaky, crumbling like clay, or it ran away in little streams and puddles of ammonia salts. Only by stepping up the toughness and strength of that metal, by increasing its electronic tension, could it be made to withstand the weight of thousands of miles of swirling, choking gases that made up the atmosphere. And even when that was done, everything had to be coated with tough quartz to keep away the rain—the bitter rain that was liquid ammonia.

Fowler sat listening to the engines in the sub-floor of the dome. Engines that ran on endlessly, the dome never quiet of them. They had to run and keep on running. For if they stopped the power flowing into the metal walls of the dome would stop, the electronic tension would ease up and that would be the end of everything.

Towser roused himself under Fowler's desk and scratched another flea, his leg thumping hard against the floor.

"Is there anything else?" asked Allen.

Fowler shook his head. "Perhaps there's something you want to do," he said. "Perhaps you—"

He had meant to say write a letter and he was glad he caught himself quick enough so he didn't say it.

Allen looked at his watch. "I'll be there on time," he said. He swung around and headed for the door.

Fowler knew Miss Stanley was watching him and he didn't want to turn and meet her eyes. He fumbled with a sheaf of papers on the desk before him.

"How long are you going to keep this up?" asked Miss Stanley and she bit off each word with a vicious snap.

He swung around in his chair and faced her then. Her lips were drawn into a straight, thin line, her hair seemed skinned back from her forehead tighter than ever, giving her face that queer, almost startling death-mask quality.

He tried to make his voice cool and level. "As long as there's any need of it," he said. "As long as there's any hope."

"You're going to keep on sentencing them to death," she said. "You're going to keep marching them out face to face with Jupiter. You're going to sit in here safe and comfortable and send them out to die."

"There is no room for sentimentality, Miss Stanley," Fowler said, trying to keep the note of anger

from his voice. "You know as well as I do why we're doing this. You realize that Man in his own form simply cannot cope with Jupiter. The only answer is to turn men into the sort of things that can cope with it. We've done it on the other planets.

"If a few men die, but we finally succeed, the price is small. Through the ages men have thrown away their lives on foolish things, for foolish reasons. Why should we hesitate, then, at a little death in a thing as great as this?"

Miss Stanley sat stiff and straight, hands folded in her lap, the lights shining on her graying hair and Fowler, watching her, tried to imagine what she might feel, what she might be thinking. He wasn't exactly afraid of her, but he didn't feel quite comfortable when she was around. Those sharp blue eyes saw too much, her hands looked far too competent. She should be somebody's Aunt sitting in a rocking chair with her knitting needles. But she wasn't. She was the top-notch conversion unit operator in the Solar System and she didn't like the way he was doing things.

"There is something wrong, Mr. Fowler," she declared.

"Precisely," agreed Fowler. "That's why I'm sending young Allen out alone. He may find out what it is."

"And if he doesn't?"

"I'll send someone else."

She rose slowly from her chair, started toward the door, then stopped before his desk.

"Some day," she said, "you will be a great man. You never let a chance go by. This is your chance. You knew it was when this dome was picked for the tests. If you put it through, you'll go up a notch or two. No matter how many men may die, you'll go up a notch or two."

"Miss Stanley," he said and his voice was curt, "young Allen is going out soon. Please be sure that your machine—"

"My machine," she told him, icily, "is not to blame. It operates along the co-ordinates the biologists set up."

He sat hunched at his desk, listening to her footsteps go down the corridor.

What she said was true, of course. The biologists had set up the co-ordinates. But the biologists could be wrong. Just a hairbreath of difference, one iota of digression and the converter would be sending out something that wasn't the thing they meant to send. A mutant that might crack up, go haywire, come unstuck under some condition or stress of circumstance wholly unsuspected.

For Man didn't know much about what was going on outside. Only what his instruments told him was going on. And the samplings of those happenings furnished by those instruments and mechanisms had been no more than samplings, for Jupiter was unbelievably large and the domes were very few.

Even the work of the biologists in getting the data on the Lopers, apparently the highest form of Jovian

life, had involved more than three years of intensive study and after that two years of checking to make sure. Work that could have been done on Earth in a week or two. But work that, in this case, couldn't be done on Earth at all, for one couldn't take a Jovian life form to Earth. The pressure here on Jupiter couldn't be duplicated outside of Jupiter and at Earth pressure and temperature the Lopers would simply have disappeared in a puff of gas.

Yet it was work that had to be done if Man ever hoped to go about Jupiter in the life form of the Lopers. For before the converter could change a man to another life form, every detailed physical characteristic of that life form must be known—surely and positively, with no chance of mistake.

Allen did not come back.

The tractors, combing the nearby terrain, found no trace of him, unless the skulking thing reported by one of the drivers had been the missing Earthman in Loper form.

The biologists sneered their most accomplished academic sneers when Fowler suggested the co-ordinates might be wrong. Carefully they pointed out, the co-ordinates worked. When a man was put into the converter and the switch was thrown, the man became a Loper. He left the machine and moved away, out of sight, into the soupy atmosphere.

Some quirk, Fowler had suggested; some tiny deviation from the thing a Loper should be, some minor defect. If there were, the biologists said, it would take years to find it.

And Fowler knew that they were right.

So there were five men now instead of four and Harold Allen had walked out into Jupiter for nothing at all. It was as if he'd never gone so far as knowledge was concerned.

Fowler reached across his desk and picked up the personal file, a thin sheaf of paper neatly clipped together. It was a thing he dreaded but a thing he had to do. Somehow the reason for these strange disappearances must be found. And there was no other way than to send out more men.

He sat for a moment listening to the howling of the wind above the dome, the everlasting thundering gale that swept across the planet in boiling, twisting wrath.

Was there some threat out there, he asked himself? Some danger they did not know about? Something that lay in wait and gobbled up the Lopers, making no distinction between Lopers that were *bona fide* and Lopers that were men? To the gobblers, of course, it would make no difference.

Or had there been a basic fault in selecting the Lopers as the type of life best fitted for existence on the surface of the planet? The evident intelligence of the Lopers, he knew, had been one factor in that determination. For if the thing Man became did not have capacity for intelligence, Man could not for long retain his own intelligence in such a guise.

Had the biologists let that one factor weigh too heavily, using it to offset some other factor that might be unsatisfactory, even disastrous? It didn't seem likely. Stiff-necked as they might be, the biologists knew their business.

Or was the whole thing impossible, doomed from the very start? Conversion to other life forms had worked on other planets, but that did not necessarily mean it would work on Jupiter. Perhaps Man's intelligence could not function correctly through the sensory apparatus provided Jovian life. Perhaps the Lopers were so alien there was no common ground for human knowledge and the Jovian conception of existence to meet and work together.

Or the fault might lie with Man, be inherent with the race. Some mental aberration which, coupled with what they found outside, wouldn't let them come back. Although it might not be an aberration, not in the human sense. Perhaps just one ordinary human mental trait, accepted as commonplace on Earth, would be so violently at odds with Jovian existence that it would blast all human intelligence and sanity.

Claws rattled and clicked down the corridor. Listening to them, Fowler smiled wanly. It was Towser coming back from the kitchen, where he had gone to see his friend, the cook.

Towser came into the room, carrying a bone. He wagged his tail at Fowler and flopped down beside the desk, bone between his paws. For a long moment his rheumy old eyes regarded his master and Fowler reached down a hand to ruffle a ragged ear.

"You still like me, Towser?" Fowler asked and Towser thumped his tail.

"You're the only one," said Fowler. "All through the dome they're cussing me. Calling me a murderer, more than likely."

He straightened and swung back to the desk. His hand reached out

and picked up the file.

Bennett? Bennett had a girl waiting for him back on Earth.

Andrews? Andrews was planning on going back to Mars Tech just as soon as he earned enough to see him through a year.

Olson? Olson was nearing pension age. All the time telling the boys how he was going to settle down and grow roses.

Carefully, Fowler laid the file back on the desk.

Sentencing men to death. Miss Stanley had said that, her pale lips scarcely moving in her parchment face. Marching men out to die while he, Fowler, sat here safe and comfortable.

They were saying it all through the dome, no doubt, especially since Allen had failed to return. They wouldn't say it to his face, of course. Even the man or men he called before this desk and told they were the next to go, wouldn't say it to him.

They would only say: "When do we start?" For that was formula.

But he would see it in their eyes.

He picked up the file again. Bennett, Andrews, Olson. There were others, but there was no use in going on.

Kent Fowler knew that he couldn't do it, couldn't face them, couldn't send more men out to die.

He leaned forward and flipped up the toggle on the intercommunicator.

"Yes, Mr. Fowler."

"Miss Stanley, please."

He waited for Miss Stanley, listening to Towser chewing half-heartedly on the bone. Towser's teeth were getting bad.

"Miss Stanley," said Miss Stanley's voice.

"Just wanted to tell you, Miss Stanley, to get ready for two more."

"Aren't you afraid," asked Miss Stanley, "that you'll run out of them? Sending out one at a time, they'd last longer, give you twice the satisfaction."

"One of them," said Fowler, "will be a dog."

"A dog!"

"Yes, Towser."

He heard the quick, cold rage that iced her voice. "Your own dog! He's been with you all these years—"

"That's the point," said Fowler. "Towser would be unhappy if I left him behind."

It was not the Jupiter he had known through the televisor. He had expected it to be different, but not like this. He had expected a hell of ammonia rain and stinking fumes and the deafening, thundering tumult of the storm. He had expected swirling clouds and fog and the snarling flicker of monstrous thunderbolts.

He had not expected the lashing downpour would be reduced to drifting purple mist that moved like fleeing shadows over a red and purple sward. He had not even guessed the snaking bolts of lightning would be flares of pure ecstacy across a painted sky.

Waiting for Towser, Fowler flexed the muscles of his body, amazed at the smooth, sleek strength

he found. Not a bad body, he decided, and grimaced at remembering how he had pitied the Lopers when he glimpsed them through the television screen.

For it had been hard to imagine a living organism based upon ammonia and hydrogen rather than upon water and oxygen, hard to believe that such a form of life could know the same quick thrill of life that humankind could know. Hard to conceive of life out in the soupy maelstrom that was Jupiter, not knowing, of course, that through Jovian eyes it was no soupy maelstrom at all.

The wind brushed against him with what seemed gentle fingers and he remembered with a start that by Earth standards the wind was a roaring gale, a two-hundred-mile an hour howler laden with deadly gases.

Pleasant scents seeped into his body. And yet scarcely scents, for it was not the sense of smell as he remembered it. It was as if his whole being was soaking up the sensation of lavender—and yet not lavender. It was something, he knew, for which he had no word, undoubtedly the first of many enigmas in terminology. For the words he knew, the thought symbols that served him as an Earthman would not serve him as a Jovian.

The lock in the side of the dome opened and Towser came tumbling out—at least he thought it must be Towser.

He started to call to the dog, his mind shaping the words he meant to say. But he couldn't say them. There was no way to say them. He had nothing to say them with.

For a moment his mind swirled in muddy terror, a blind fear that eddied in little puffs of panic through his brain.

How did Jovians talk? How—

Suddenly he was aware of Towser, intensely aware of the bumbling, eager friendliness of the shaggy animal that had followed him from Earth to many planets. As if the thing that was Towser had reached out and for a moment sat within his brain.

And out of the bubbling welcome that he sensed, came words.

"Hiya, pal."

Not words really, better than words. Thought symbols in his brain, communicated thought symbols that had shades of meaning words could never have.

"Hiya, Towser," he said.

"I feel good," said Towser. "Like I was a pup. Lately I've been feeling pretty punk. Legs stiffening up on me and teeth wearing down to almost nothing. Hard to mumble a bone with teeth like that. Besides, the fleas give me hell. Use to be I never paid much attention to them. A couple of fleas more or less never meant much in my early days."

"But . . . but—" Fowler's thoughts tumbled awkwardly. "You're talking to me!"

"Sure thing," said Towser. "I always talked to you, but you couldn't hear me. I tried to say things to you, but I couldn't make the grade."

"I understood you sometimes," Fowler said.

"Not very well," said Towser. "You knew when I wanted food and when I wanted a drink and when I wanted out, but that's about all you ever managed."

"I'm sorry," Fowler said.

"Forget it," Towser told him. "I'll race you to the cliff."

For the first time, Fowler saw the cliff, apparently many miles away, but with a strange crystalline beauty that sparkled in the shadow of the many-colored clouds.

Fowler hesitated. "It's a long way—"

"Ah, come on," said Towser and even as he said it he started for the cliff.

Fowler followed, testing his legs, testing the strength in that new body of his, a bit doubtful at first, amazed a moment later, then running with a sheer joyousness that was one with the red and purple sward, with the drifting smoke of the rain across the land.

As he ran the consciousness of music came to him, a music that beat into his body, that surged throughout his being, that lifted him on wings of silver speed. Music like bells might make from some steeple on a sunny, springtime hill.

As the cliff drew nearer the music deepened and filled the universe with a spray of magic sound. And he knew the music came from the tumbling waterfall that feathered down the face of the shining cliff.

Only, he knew, it was no waterfall, but an ammonia-fall and the cliff was white because it was oxygen, solidified.

He skidded to a stop beside Towser where the waterfall broke into a glittering rainbow of many hundred colors. Literally many hundred, for here, he saw, was no shading of one primary to another as human beings saw, but a clear-cut selectivity that broke the prism down to its last ultimate classification.

"The music," said Towser.

"Yes, what about it?"

"The music," said Towser, "is vibrations. Vibrations of water falling."

"But Towser, you don't know about vibrations."

"Yes, I do," contended Towser. "It just popped into my head."

Fowler gulped mentally. "Just popped!"

And suddenly, within his own head, he held a formula—the formula for a process that would make metal to withstand the pressure of Jupiter.

He stared, astounded, at the waterfall and swiftly his mind took the many colors and placed them in their exact sequence in the spectrum. Just like that. Just out of blue sky. Out of nothing, for he knew nothing either of metals or of colors.

"Towser," he cried. "Towser, something's happening to us!"

"Yeah, I know," said Towser.

"It's our brains," said Fowler. "We're using them, all of them, down to the last hidden corner. Using them to figure out things we should have known all the time.

Maybe the brains of Earth things naturally are slow and foggy. Maybe we are the morons of the universe. Maybe we are fixed so we have to do things the hard way."

And, in the new sharp clarity of thought that seemed to grip him, he knew that it would not only be the matter of colors in a waterfall or metals that would resist the pressure of Jupiter, he sensed other things, things not yet quite clear. A vague whispering that hinted of greater things, of mysteries beyond the pale of human thought, beyond even the pale of human imagination. Mysteries, fact, logic built on reasoning. Things that any brain should know if it used all its reasoning power.

"We're still mostly Earth," he said. "We're just beginning to learn a few of the things we are to know—a few of the things that were kept from us as human beings, perhaps because we were human beings. Because our human bodies were poor bodies. Poorly equipped for thinking, poorly equipped in certain senses that one has to have to know. Perhaps even lacking in certain senses that are necessary to true knowledge."

He stared back at the dome, a tiny black thing dwarfed by the distance.

Back there were men who couldn't see the beauty that was Jupiter. Men who thought that swirling clouds and lashing rain obscured the face of the planet. Unseeing human eyes. Poor eyes. Eyes that could not see the beauty in the clouds, that could not see

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through the storms. Bodies that could not feel the thrill of trilling music stemming from the rush of broken water.

Men who walked alone, in terrible loneliness, talking with their tongue like Boy Scouts wigwagging out their messages, unable to reach out and touch one another's mind as he could reach out and touch Towser's mind. Shut off forever from that personal, intimate contact with other living things.

He, Fowler, had expected terror inspired by alien things out here on the surface, had expected to cower before the threat of unknown things, had steeled himself against disgust of a situation that was not of Earth.

But instead he had found something greater than Man had ever known. A swifter, surer body. A sense of exhilaration, a deeper sense of life. A sharper mind. A world of beauty that even the dreamers of the Earth had not yet imagined.

"Let's get going," Towser urged.

"Where do you want to go?"

"Anywhere," said Towser. "Just start going and see where we end up. I have a feeling . . . well, a feeling—"

"Yes, I know," said Fowler.

For he had the feeling, too. The feeling of high destiny. A certain sense of greatness. A knowledge that somewhere off beyond the horizons lay adventure and things greater than adventure.

Those other five had felt it, too. Had felt the urge to go and see, the compelling sense that here lay a life of fullness and of knowledge.

That, he knew, was why they had not returned.

"I won't go back," said Towser.

"We can't let them down," said Fowler.

Fowler took a step or two, back toward the dome, then stopped.

Back to the dome. Back to that aching, poison-laden body he had left. It hadn't seemed aching before, but now he knew it was.

Back to the fuzzy brain. Back to muddled thinking. Back to the flapping mouths that formed signals others understood. Back to eyes that now would be worse than no sight at all. Back to squalor, back to crawling, back to ignorance.

"Perhaps some day," he said, muttering to himself.

"We got a lot to do and a lot to see," said Towser. "We got a lot to learn. We'll find things—"

Yes, they could find things. Civilizations, perhaps. Civilizations that would make the civilization of Man seem puny by comparison. Beauty and more important—an understanding of that beauty. And a comradeship no one had ever known before—that no man, no dog had ever known before.

And life. The quickness of life after what seemed a drugged existence.

"I can't go back," said Towser.

"Nor I," said Fowler.

"They would turn me back into a dog," said Towser.

"And me," said Fowler, "back into a man."

THE END.

When The Bough Breaks

by LEWIS PADGETT

The boy was a super-baby. His parents didn't know it, though, till the strange little servants came back through time to set up a strange sort of school—and a strange sort of inevitable dilemma.

Illustrated by Williams

They were surprised at getting the apartment, what with high rents and written-in clauses in the lease, and Joe Calderon felt himself lucky to be only ten minutes' subway ride from the University. His wife, Myra, fluffed up her red hair in a distracted fashion and said that landlords presumably expected parthenogenesis in their tenants, if that was what she meant. Anyhow, it was where an organism split in two and the result was two mature specimens. Calderon grinned, said, "Binary fission, chump," and watched young Alexander, aged eighteen

months, backing up on all fours across the carpet, preparatory to assuming a standing position on his fat bowlegs.

It was a pleasant apartment, at that. The sun came into it at times, and there were more rooms than they had any right to expect, for the price. The next-door neighbor, a billowy blonde who talked of little except her migraine, said that it was hard to keep tenants in 4-D. It wasn't exactly haunted, but it had the queerest visitors. The last lessee, an insurance man who drank heavily, moved out one day talking about little men who came ringing the bell at all hours asking for a Mr. Pott, or somebody like that. Not until some time later did Joe identify Pott with Cauldron—or Calderon.

They were sitting on the couch in a pleased manner, looking at Alexander. He was quite a baby. Like all infants, he had a collar of fat at the back of his neck, and his legs, Calderon said, were like two vast and trunkless limbs of stone—at least they gave that effect. The eye stopped at their incredible bulging pinkness, fascinated. Alexander laughed like a fool, rose to his feet, and staggered drunkenly toward his parents, muttering unintelligible gibberish. "Madman," Myra said fondly, and tossed the child a floppy velvet pig of whom he was enamored.

"So we're all set for the winter," Calderon said. He was a tall, thin, harassed-looking man, a fine research physicist, and very much interested in his work at the University. Myra was a rather fragile redhead, with a tilted nose and sardonic red-brown eyes. She made deprecatory noises.

"If we can get a maid. Otherwise I'll char."

"You sound like a lost soul," Calderon said. "What do you mean, you'll char?"

"Like a charwoman. Sweep, cook, clean. Babies are a great trial. Still, they're worth it."

"Not in front of Alexander. He'll get above himself."

The doorbell rang. Calderon uncoiled himself, wandered vaguely across the room, and opened the door. He blinked at nothing. Then he lowered his gaze somewhat, and what he saw was sufficient to make him stare a little.

Four tiny men were standing in the hall. That is, they were tiny below the brows. Their craniums were immense, watermelon large and watermelon shaped, or else they were wearing abnormally huge helmets of glistening metal. Their faces were wizened, peaked tiny masks that were nests of lines and wrinkles. Their clothes were garish, unpleasantly colored, and seemed to be made of paper.

"Oh?" Calderon said blankly.

Swift looks were exchanged among the four. One of them said, "Are you Joseph Calderon?"

"Yeah."

"We," said the most wrinkled of the quartet, "are your son's descendents. He's a super child. We're here to educate him."

"Yes," Calderon said. "Yes, of course. I . . . *listen!*"

"To what?"

"Super—"

"There he is," another dwarf cried. "It's Alexander! We've hit the right time at last!" He scuttled past Calderon's legs and into the room. Calderon made a few futile snatches, but the small men easily evaded him. When he turned, they were gathered around Alexander. Myra had drawn up her legs under her and was watching with an amazed expression.

"Look at that," a dwarf said. "See his potential tefeetzie?" It sounded like tefeetzie.

"But his skull, Bordent," another put in. "That's the important part. The vyrings are almost perfectly coblastably."

"Beautiful," Bordent acknowledged. He leaned forward. Alexander reached forward into the nest of wrinkles, seized Bordent's nose, and twisted painfully. Bordent bore it stoically until the grip relaxed.

"Undeveloped," he said tolerantly. "We'll develop him."

Myra sprang from the couch, picked up her child, and stood at bay, facing the little men. "Joe," she said, "are you going to stand for this? Who are these bad-mannered goblins?"

"Lord knows," Calderon said. He moistened his lips. "What kind of a gag is that? Who sent you?"

"Alexander," Bordent said. "From the year . . . ah . . . about 2450, reckoning roughly. He's practically immortal. Only violence can kill one of the Supers, and there's none of that in 2450."

Calderon sighed. "No, I mean it. A gag's a gag. But—"

"Time and again we've tried. In 1940, 1944, 1947—all around this era. We were either too early or too late. But now we've hit on the right time-sector. It's our job to educate Alexander. You should feel proud of being his parents. We worship you, you know. Father and mother of the new race."

"Tuh!" Calderon said. "Come off it!"

"They need proof, Dobish," someone said. "Remember, this is their first inkling that Alexander is homo superior."

"Homo nuts," Myra said. "Alexander's a perfectly normal baby."

"He's perfectly supernormal," Dobish said. "We're his descendents."

"That makes you a superman," Calderon said skeptically, eyeing the small man.

"Not in toto. There aren't many of the X Free type. The biological norm is specialization. Only a few are straight-line super. Some specialize in logic, others in vervainity, others—like us—are guides. If we were X Free supers, you couldn't stand there and talk to us. Or look at us. We're only parts. Those like Alexander are the glorious whole."

"Oh, send them away," Myra said, getting tired of it. "I feel like a Thurber woman."

Calderon nodded. "O.K. Blow, gentlemen. Take a powder, I mean it."

"Yes," Dobish said, "they need

proof. What'll we do? Skyskinate?"

"Too twisty," Bordent objected. "Object lesson, eh? The stiller."

"Stiller?" Myra asked.

Bordent took an object from his paper clothes and spun it in his hands. His fingers were all double-jointed. Calderon felt a tiny electric shock go through him.

"Joe," Myra said, white-faced. "I can't move."

"Neither can I. Take it easy. This is . . . it's—" He slowed and stopped.

"Sit down," Bordent said, still twirling the object. Calderon and Myra backed up to the couch and sat down. Their tongues froze with the rest of them.

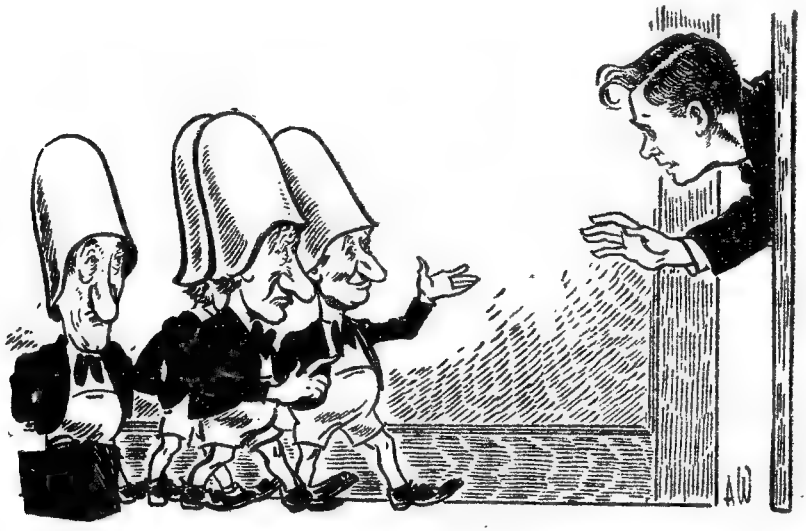
Dobish came over, clambered up, and pried Alexander out of his mother's grip. Horror moved in her eyes.

"We won't hurt him," Dobish said. "We just want to give him his first lesson. Have you got the basics, Finn?"

"In the bag." Finn extracted a foot-long bag from his garments. Things came out of that bag. They came out incredibly. Soon the carpet was littered with stuff—problematical in design, nature, and use. Calderon recognized a tesseract.

The fourth dwarf, whose name, it turned out, was Quat, smiled consolingly at the distressed parents. "You watch. You can't learn; you've not got the potential. You're homo saps. But Alexander, now—"

Alexander was in one of his moods. He was diabolically gay. With the devil-possession of all babies, he refused to collaborate. He crept rapidly backwards. He burst into loud, squalling sobs. He regarded his feet with amazed joy. He stuffed his fist into his mouth and cried bitterly at the result. He



talked about invisible things in a soft, cryptic monotone. He punched Dobish in the eye.

The little men had inexhaustible patience. Two hours later they were through. Calderon couldn't see that Alexander had learned much.

Bordent twirled the object again. He nodded affably, and led the retreat. The four little men went out of the apartment, and a moment later Calderon and Myra could move.

She jumped up, staggering on numbed legs, seized Alexander, and collapsed on the couch. Calderon rushed to the door and flung it open. The hall was empty.

"Joe—" Myra said, her voice small and afraid. Calderon came back and smoothed her hair. He looked down at the bright fuzzy head of Alexander.

"Joe. We've got to—do something."

"I don't know," he said. "If it happened—"

"It happened. They took those things with them. Alexander. Oh!"

"They didn't try to hurt him," Calderon said hesitatingly.

"Our *baby!* He's no superchild."

"Well," Calderon said, "I'll get out my revolver. What else can I do?"

"I'll do something," Myra promised. "Nasty little goblins! I'll do something, just wait."

And yet there wasn't a great deal they could do.

Tacitly they ignored the subject the next day. But at 4 p.m., the same time as the original visitation, they were with Alexander in a theater, watching the latest technicolor film. The four little men could scarcely find them here—

Calderon felt Myra stiffen, and even as he turned, he suspected the worst. Myra sprang up, her breath catching. Her fingers tightened on his arm.

"He's gone!"

"G-gone?"

"He just vanished. I was holding him . . . let's get out of here."

"Maybe you dropped him," Calderon said inanely, and lit a match. There were cries from behind. Myra was already pushing her way toward the aisle. There were no babies under the seat, and Calderon caught up with his wife in the lobby.

"He disappeared," Myra was babbling. "Like that. Maybe he's in the future. Joe, what'll we do?"

Calderon, through some miracle, got a taxi. "We'll go home. That's the most likely place. I hope."

"Yes. Of course it is. Give me a cigarette."

"He'll be in the apartment—"

He was, squatting on his haunches, taking a decided interest in the gadget Quat was demonstrating. The gadget was a gayly-colored egg beater with four-dimensional attachments, and it talked in a thin, high voice. Not in English.

Bordent flipped out the stiller and began to twirl it as the couple came in. Calderon got hold of Myra's arms and held her back. "Hold on," he said urgently. "That isn't

necessary. We won't try anything."

"Joe!" Myra tried to wriggle free. "Are you going to let them—"

"Quiet!" he said. "Bordent, put that thing down. We want to talk to you."

"Well—if you promise not to interrupt—"

"We promise." Calderon forcibly led Myra to the couch and held her there. "Look, darling. Alexander's all right. They're not hurting him."

"Hurt him, indeed!" Finn said.

"He'd skin us alive in the future if we hurt him in the past."

"Be quiet," Bordent commanded. He seemed to be the leader of the four. "I'm glad you're co-operating, Joseph Calderon. It goes against my grain to use force on a demigod. After all, you're *Alexander's* father."

Alexander put out a fat paw and tried to touch the whirling rainbow egg beater. He seemed to be fascinated. Quat said, "The kivelish is sparking. Shall I vastinate?"

"Not too fast," Bordent said. "He'll be rational in a week, and then we can speed up the process. Now, Calderons, please relax. Anything you want?"

"A drink."

"They mean alcohol," Finn said. "The Rubaiyat mentions it, remember?"

"Rubaiyat?"

"The singing red gem in Twelve Library."

"Oh, yes," Bordent said. "That one. I was thinking of the Yahveh slab, the one with the thunder effects. Do you want to make some alcohol, Finn?"

Calderon swallowed. "Don't bother. I have some in that sideboard. May I—"

"You're not *prisoners*." Bordent's voice was shocked. "It's just that we've got to make you listen to a few explanations, and after that—well, it'll be different."

Myra shook her head when Calderon handed her a drink, but he scowled at her meaningly. "You won't feel it. Go ahead."

She hadn't once taken her gaze from Alexander. The baby was imitating the thin noise of the egg beater now. It was subtly unpleasant.

"The ray is working," Quat said. "The viewer shows some slight cortical resistance, though."

"Angle the power," Bordent told him.

Alexander said, "Modjewabba?"

"What's that?" Myra asked in a strained voice. "Super language?"

Bordent smiled at her. "No, just baby talk."

Alexander burst into sobs. Myra said, "Super baby or not, when he cries like that, there's a good reason. Does your tutoring extend to that point?"

"Certainly," Quat said calmly. He and Finn carried Alexander out. Bordent smiled again.

"You're beginning to believe," he said. "That helps."

Calderon drank, feeling the hot fumes of whiskey along the backs of his cheeks. His stomach was crawling with cold uneasiness.

"If you were human—" he said doubtfully.

"If we were, we wouldn't be here. The old order changeth. It had to start sometime. Alexander is the first homo superior."

"But why us?" Myra asked.

"Genetics. You've both worked with radioactivity and certain short-wave radiations that effected the germ plasm. The mutation just happened. It'll happen again from now on. But you happen to be the first. You'll die, but Alexander will live on. Perhaps a thousand years."

Calderon said, "This business of coming from the future . . . you say Alexander sent you?"

"The adult Alexander. The mature superman. It's a different culture, of course—beyond your comprehension. Alexander is one of the X Frees. He said to me, through the interpreting-machine, of course, 'Bordent, I wasn't recognized as a super till I was thirty years old. I had only ordinary homo sap development till then. I didn't know my potential myself. And that's bad.' It *is* bad, you know," Bordent digressed. "The full capabilities of an organism can't emerge unless it's given the fullest chance of expansion from birth on. Or at least from infancy. Alexander said to me, 'It's about five hundred years ago that I was born. Take a few guides and go into the past. Locate me as an infant. Give me specialized training, from the beginning. I think it'll expand me."

"The past," Calderon said. "You mean it's plastic?"

"Well, it affects the future. You can't alter the past without altering the future, too. But things tend to drift back. There's a temporal norm, a general level. In the original time sector, Alexander wasn't visited by us. Now that's changed. So the future will be changed. But not tremendously. No crucial temporal apexes are involved, no keystones. The only result will be that the mature Alexander will have his potential more fully realized."

Alexander was carried back into the room, beaming. Quat resumed his lesson with the egg beater.

"There isn't a great deal you can do about it," Bordent said. "I think you realize that now."

Myra said, "Is Alexander going to look like you?" Her face was strained.

"Oh, no. He's a perfect physical specimen. I've never seen him, of course, but—"

Calderon said, "Heir to all the

ages. Myra, are you beginning to get the idea?"

"Yes. A superman. But he's our baby."

"He'll remain so," Bordent put in anxiously. "We don't want to remove him from the beneficial home and parental influence. An infant needs that. In fact, tolerance for the young is an evolutionary trait aimed at providing for the superman's appearance, just as the vanishing appendix is such a preparation. At certain eras of history mankind is receptive to the preparation of the new race. It's never been quite successful before—there were anthropological miscarriages, so to speak. My squeevers, it's *important!* Infants are awfully irritating. They're helpless for a very long time, a great trial to the patience of the parents—the lower the order of animal, the faster the infant develops. With mankind, it takes years for the young to reach an independent state. So the parental tolerance increases in proportion. The superchild won't mature, actually, till he's about twenty."

Myra said, "Alexander will still be a baby then?"

"He'll have the physical standards of an eight-year-old specimen of homo sap. Mentally . . . well, call it irrationality. He won't be leveled out to an intellectual or emotional norm. He won't be sane, any more than any baby is. Selectivity takes quite a while to develop. But his peaks will be far, far above the peaks of, say, *you* as a child."

"Thanks," Calderon said.

"His horizons will be broader. His mind is capable of grasping and assimilating far more than yours. The world is really his oyster. He won't be limited. But it'll take a while for his mind, his personality, to shake down."

"I want another drink," Myra said.

Calderon got it. Alexander inserted his thumb in Quat's eye and tried to gouge it out. Quat submitted passively.

"Alexander!" Myra said.

"Sit still," Bordent said. "Quat's tolerance in this regard is naturally higher developed than yours."

"If he puts Quat's eye out," Calderon said, "it'll be just too bad."

"Quat isn't important, compared to Alexander. He knows it, too."

Luckily for Quat's binocular vision, Alexander suddenly tired of his new toy and fell to staring at the egg beater again. Dobish and Finn leaned over the baby and looked at him. But there was more to it than that, Calderon felt.

"Induced telepathy," Bordent said. "It takes a long time to develop, but we're starting now. I tell you, it was a relief to hit the right time at last. I've rung this doorbell at least a hundred times. But never till now—"

"Move," Alexander said clearly. "Real. Move."

Bordent nodded. "Enough for today. We'll be here again tomorrow. You'll be ready?"

"As ready," Myra said, "as we'll ever be, I suppose." She finished her drink.

They got fairly high that night and talked it over. Their arguments were biased by their realization of the four little men's obvious resources. Neither doubted any more. They knew that Bordent and his companions had come from five hundred years in the future, at the command of a future Alexander who had matured into a fine specimen of superman.

"Amazing, isn't it?" Myra said. "That fat little blob in the bedroom turning into a twelfth-power Quiz Kid."

"Well, it's got to start somewhere. As Bordent pointed out."

"And as long as he isn't going to look like those goblins—ugh!"

"He'll be super. Deucalion and what's-her-name—that's us. Parents of a new race."

"I feel funny," Myra said. "As though I'd given birth to a moose."

"That could never happen," Calderon said consolingly. "Have another slug."

"It might as well have happened. Alexander is a swoose."

"Swoose?"

"I can use that goblin's double-talk, too. Vopishly woggle in the grand foyer. So there."

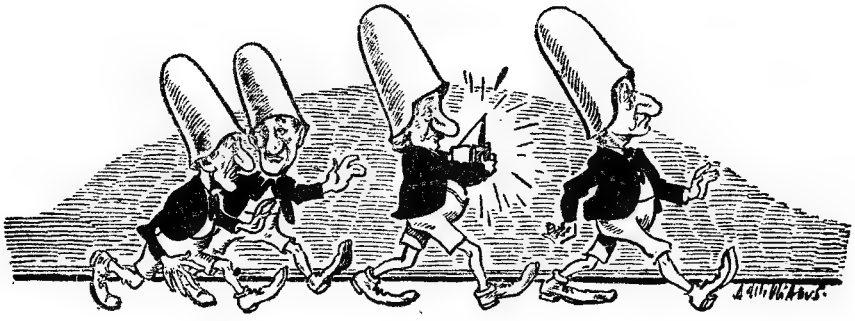
"It's a language to them," Calderon said.

"Alexander's going to talk English. I've got my rights."

"Well, Bordent doesn't seem anxious to infringe on them. He said Alexander needed a home environment."

"That's the only reason I haven't gone crazy," Myra said. "As long as he . . . they . . . don't take our baby away from us—"

A week later it was thoroughly clear that Bordent had no intention of encroaching on parental rights—at least, any more than was necessary, for two hours a day. During that period the four little men fulfilled their orders by cramming Alexander with all the knowledge his infantile but super brain could hold. They did not depend on blocks or nursery rhymes or the abacus. Their weapons in the battle were cryptic, futuristic, but effective. And they taught Alexander, there was no doubt of that. As B-1 poured on a plant's roots forces



growth, so the vitamin teaching of the dwarfs soaked into Alexander, and his potentially superhuman brain responded, expanding with brilliant, erratic speed.

He had talked intelligibly on the fourth day. On the seventh day he was easily able to hold conversations, though his baby muscles, lingually undeveloped, tired easily. His cheeks were still sucking-disks; he was not yet fully human, except in sporadic flashes. Yet those flashes came oftener now, and closer together.

The carpet was a mess. The little men no longer took their equipment back with them; they left it for Alexander to use. The infant crept—he no longer bothered to walk much, for he could crawl with more efficiency—among the Objects, selected some of them, and put them together. Myra had gone out to shop. The little men wouldn't show up for half an hour. Calderon, tired from his day's work at the University, fingered a highball and looked at his offspring.

"Alexander," he said.

Alexander didn't answer. He fitted a gadget to a Thing, inserted it peculiarly in a Something Else, and sat back with an air of satisfaction. Then—"Yes?" he said. It wasn't perfect pronunciation, but it was unmistakable. Alexander talked somewhat like a toothless old man.

"What are you doing?" Calderon said.

"No."

"What's that?"

"No."

"No?"

"I understand it," Alexander said. "That's enough."

"I see." Calderon regarded the prodigy with faint apprehension. "You don't want to tell me."

"No."

"Well, all right."

"Get me a drink," Alexander said. For a moment Calderon had a mad idea that the infant was demanding a highball. Then he sighed, rose, and returned with a bottle.

"Milk," Alexander said, refusing the potation.

"You said a drink. Water's a drink, isn't it?" My God, Calderon thought, I'm arguing with the kid. I'm treating him like . . . like an adult. But he isn't. He's a fat little baby squatting on his behind on the carpet, playing with a tinkertoy.

The tinkertoy said something in a thin voice. Alexander murmured, "Repeat." The tinkertoy did.

Calderon said, "What was that?"

"No."

"Nuts." Calderon went out to the kitchen and got milk. He poured himself another shot. This was like having relatives drop in suddenly—relatives you hadn't seen for ten years. How the devil did you *act* with a superchild?

He stayed in the kitchen, after supplying Alexander with his milk. Presently Myra's key turned in the outer door. Her cry brought Calderon hurrying.

Alexander was vomiting, with the air of a research man absorbed in a fascinating phenomenon.

"Alexander!" Myra cried. "Darling, are you sick?"

"No," Alexander said. "I'm testing my regurgitative processes. I must learn to control my digestive organs."

Calderon leaned against the door, grinning crookedly. "Yeah. You'd better start now, too."

"I'm finished," Alexander said. "Clean it up."

Three days later the infant decided that his lungs needed developing. He cried. He cried at all hours, with interesting variations—whoops, squalls, wails, and high-pitched bellows. Nor would he stop till he was satisfied. The neighbors complained. Myra said, "Darling, is there a pin sticking you? Let me look—"

"Go away," Alexander said. "You're too warm. Open the window. I want fresh air."

"Yes, d-darling. Of course." She came back to bed and Calderon put his arm around her. He knew there would be shadows under her eyes in the morning. In his crib Alexander cried on.

So it went. The four little men came daily and gave Alexander his lessons. They were pleased with the infant's progress. They did not complain when Alexander indulged in his idiosyncrasies, such as batting them heavily on the nose or ripping their paper garments to shreds. Bordent tapped his metal helmet and smiled triumphantly at Calderon.

"He's coming along. He's developing."

"I'm wondering. What about discipline?"

Alexander looked up from his rapport with Quat. "Homo sap discipline doesn't apply to me, Joseph Calderon."

"Don't call me Joseph Calderon. I'm your father, after all."

"A primitive biological necessity. You are not sufficiently well developed to provide the discipline I require. Your purpose is to give me parental care."

"Which makes me an incubator," Calderon said.

"But a deified one," Bordent soothed him. "Practically a logos. The father of the new race."

"I feel more like Prometheus," the father of the new race said dourly. "He was helpful, too. And he ended up with a vulture eating his liver."

"You will learn a great deal from Alexander."

"He says I'm incapable of understanding it."

"Well, aren't you?"

"Sure. I'm just the papa bird," Calderon said, and subsided into a sad silence, watching Alexander, under Quat's tutelary eye, put together a gadget of shimmering glass and twisted metal. Bordent said suddenly, "Quat! Be careful of the egg!" And Finn seized a bluish ovoid just before Alexander's chubby hand could grasp it.

"It isn't dangerous," Quat said. "It isn't connected."

"He might have connected it."

"I want that," Alexander said. "Give it to me."

"Not yet, Alexander," Bordent refused. "You must learn the correct way of connecting it first. Otherwise it might harm you."

"I could do it."

"You are not logical enough to balance your capabilities and lacks as yet. Later it will be safe. I think now, perhaps, a little philosophy, Dobish—eh?"

Dobish squatted and went en rapport with Alexander. Myra came out of the kitchen, took a quick look at the tableau, and retreated. Calderon followed her out.

"I will never get used to it if I live a thousand years," she said with slow emphasis, hacking at the doughy rim of a pie. "He's my baby only when he's asleep."

"We won't live a thousand years," Calderon told her. "Alexander will, though. I wish we could get a maid."

"I tried again today," Myra said wearily. "No use. They're all in war plants. I mention a baby—"

"You can't do all this alone."

"You help," she said, "when you can. But you're working hard too, fella. It won't be forever."

"I wonder if we had another baby . . . if—"

Her sober gaze met his. "I've wondered that, too. But I should think mutations aren't as cheap as that. Once in a lifetime. Still, we don't know."

"Well, it doesn't matter now, anyway. One infant's enough for the moment."

Myra glanced toward the door. "Everything all right in there? Take a look. I worry."

"It's all right."

"I know, but that blue egg—Bordent said it was dangerous, you know. I heard him."

Calderon peeped through the door-crack. The four dwarfs were sitting facing Alexander, whose eyes were closed. Now they opened. The infant scowled at Calderon.

"Stay out," he requested. "You're breaking the rapport."

"I'm so sorry," Calderon said, retreating. "He's O. K., Myra. His own dictatorial little self."

"Well, he *is* a superman," she said doubtfully.

"No. He's a superbaby. There's all the difference."

"His latest trick," Myra said, busy with the oven, "is riddles. Or something like riddles. I feel so small when he catches me up. But he says it's good for his ego. It compensates for his physical frailness."

"Riddles, eh? I know a few too."

"They won't work on Alexander," Myra said, with grim assurance.

Nor did they. "What goes up a chimney up?" was treated with the contempt it deserved; Alexander examined his father's riddles, turned them over in his logical mind, analyzed them for flaws in semantics and logic, and rejected them. Or else he answered them, with such fine accuracy that Calderon was too embarrassed to give the correct answers. He was re-

duced to asking why a raven was like a writing desk, and since not even the Mad Hatter had been able to answer his own riddle, was slightly terrified to find himself listening to a dissertation on comparative ornithology. After that, he let Alexander needle him with infantile gags about the relations of gamma rays to photons, and tried to be philosophical. There are few things as irritating as a child's riddles. His mocking triumph pulverizes itself into the dust in which you grovel.

"Oh, leave your father alone," Myra said, coming in with her hair disarranged. "He's trying to read the paper."

"That news is unimportant."

"I'm reading the comics," Calderon said. "I want to see if the Katzenjammers get even with the Captain for hanging them under a waterfall."

"The formula for the humor of an incongruity predicament," Alexander began learnedly, but Calderon disgustedly went into the bedroom, where Myra joined him. "He's asking me riddles again," she said. "Let's see what the Katzenjammers did."

"You look rather miserable. Got a cold?"

"I'm not wearing make-up. Alexander says the smell makes him ill."

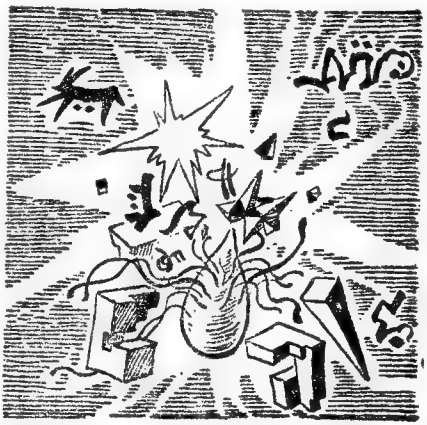
"So what? He's no petunia."

"Well," Myra said, "he does get ill. But of course he does it on purpose."

"Listen. There he goes again. What now?"

But Alexander merely wanted an audience. He had found a new way of making imbecilic noises with his fingers and lips. At times the child's normal phases were more trying than his super periods. After a month had passed, however, Calderon felt that the worst was yet to come. Alexander had progressed into fields of knowledge hitherto untouched by homo sap, and he had developed a leechlike habit of sucking his father's brains dry of every scrap of knowledge the wretched man possessed.

It was the same with Myra. The



world was indeed Alexander's oyster. He had an insatiable curiosity about everything, and there was no longer any privacy in the apartment. Calderon took to locking the bedroom door against his son at night—Alexander's crib was now in another room—but furious squalls might waken him at any hour.

In the midst of preparing dinner, Myra would be forced to stop and explain the caloric mysteries of the

oven to Alexander. He learned all she knew, took a jump into more abstruse aspects of the matter, and sneered at her ignorance. He found out Calderon was a physicist, a fact which the man had hitherto kept carefully concealed, and thereafter pumped his father dry. He asked questions about geodetics and geopolitics. He inquired about monotremes and monorails. He was curious about biremes and biology. And he was skeptical, doubting the depth of his father's knowledge. "But," he said, "you and Myra Calderon are my closest contacts with homo sap as yet, and it's a beginning. Put out that cigarette. It isn't good for my lungs."

"All right," Calderon said. He rose wearily, with his usual feeling these days of being driven from room to room of the apartment, and went in search of Myra. "Bordent's about due. We can go out somewhere. O. K.?"

"Swell." She was at the mirror, fixing her hair, in a trice. "I need a permanent. If I only had the time—!"

"I'll take off tomorrow and stay here. You need a rest."

"Darling, no. The exams are coming up. You simply can't do it."

Alexander yelled. It developed that he wanted his mother to sing for him. He was curious about the tonal range of homo sap and the probable emotional and soporific effect of lullabies. Calderon mixed himself a drink, sat in the kitchen and smoked, and thought about the glorious destiny of his son. When Myra stopped singing, he listened for Alexander's wails, but there was no sound till a slightly hysterical Myra burst in on him, dithering and wide-eyed.

"Joe!" She fell into Calderon's arms. "Quick, give me a drink or . . . or hold me tight or something."

"What is it?" He thrust the bottle into her hands, went to the door, and looked out. "Alexander? He's quiet. Eating candy."

Myra didn't bother with a glass. The bottle's neck clicked against her teeth. "Look at me. Just look at me. I'm a mess."

"What happened?"

"Oh, nothing. Nothing at all. Alexander's turned into a black magician, that's all." She dropped into a chair and passed a palm across her forehead. "Do you know what that genius son of ours just did?"

"Bit you," Calderon hazarded, not doubting it for a minute.

"Worse, far worse. He started asking me for candy. I said there wasn't any in the house. He told me to go down to the grocery for some. I said I'd have to get dressed first, and I was too tired."

"Why didn't you ask me to go?"

"I didn't have the chance. Before I could say boo that infantile Merlin waved a magic wand or something. I . . . I was down at the grocery. Behind the candy counter."

Calderon blinked. "Induced amnesia?"

"There wasn't any time-lapse. It was just *phweet*—and there I was. In this rag of a dress, without a

speck of make-up on, and my hair coming down in tassels. Mrs. Busherman was there, too, buying a chicken—that cat across the hall. She was kind enough to tell me I ought to take more care of myself. Meow," Myra ended furiously.

"Good Lord."

"Teleportation. That's what Alexander says it is. Something new he's picked up. I'm not going to stand for it, Joe. I'm not a rag doll, after all." She was half hysterical.

Calderon went into the next room and stood regarding his child. There was chocolate smeared around Alexander's mouth.

"Listen, wise guy," he said. "You leave your mother alone, hear me?"

"I didn't hurt her," the prodigy pointed out, in a blobby voice. "I was simply being efficient."

"Well, don't be so efficient. Where did you learn that trick, anyhow?"

"Teleportation? Quat showed me last night. He can't do it himself, but I'm X Free super, so I can. The power isn't disciplined yet. If I'd tried to teleport Myra Calderon over to Jersey, say, I might have dropped her in the Hudson by mistake."

Calderon muttered something uncomplimentary. Alexander said, "Is that an Anglo-Saxon derivative?"

"Never mind about that. You shouldn't have all that chocolate, anyway. You'll make yourself sick. You've already made your mother sick. And you nauseate me."

"Go away," Alexander said. "I want to concentrate on the taste."

"No. I said you'd make yourself sick. Chocolate's too rich for you. Give it here. You've had enough." Calderon reached for the paper sack. Alexander disappeared. In the kitchen Myra shrieked.

Calderon moaned despondently, and turned. As he had expected, Alexander was in the kitchen, on top of the stove, hoggishly stuffing candy into his mouth. Myra was concentrating on the bottle.

"What a household," Calderon said. "The baby teleporting himself all over the apartment, you getting stewed in the kitchen, and me heading for a nervous breakdown." He started to laugh. "O. K., Alexander. You can keep the candy. I know when to shorten my defensive lines strategically."

"Myra Calderon," Alexander said. "I want to go back into the other room."

"Fly in," Calderon suggested. "Here, I'll carry you."

"Not you. Her. She has a better rhythm when she walks."

"Staggers, you mean," Myra said, but she obediently put aside the bottle, got up, and laid hold of Alexander. She went out. Calderon was not much surprised to hear her scream a moment later. When he joined the happy family, Myra was sitting on the floor, rubbing her arms and biting her lips. Alexander was laughing.

"What now?"

"H-he sh-shocked me." Myra said in a child's voice. "He's like an electric eel. He d-did it on pur-

pose, too. Oh, Alexander, will you *stop* laughing!"

"You fell down," the infant crowed in triumph. "You yelled and fell down."

Calderon looked at Myra, and his mouth tightened. "Did you do that on purpose?" he asked.

"Yes. She fell down. She looked funny."

"You're going to look a lot funnier in a minute. X Free super or not, what you need is a good paddling."

"Joe—" Myra said.

"Never mind. He's got to learn to be considerate of the rights of others."

"I'm homo superior," Alexander said, with the air of one clinching an argument.

"It's homo posterior I'm going to deal with," Calderon announced, and attempted to capture his son. There was a stinging blaze of jolting nervous energy that blasted up through his synapses; he went backwards ignominiously, and slammed into the wall, cracking his head hard against it. Alexander laughed like an idiot.

"You fell down, too," he crowed. "You look funny."

"Joe," Myra said. "Joe. Are you hurt?"

Calderon said sourly that he supposed he'd survive. Though, he added, it would probably be wise to lay in a few splints and a supply of blood plasma. "In case he gets interested in vivisection."

Myra regarded Alexander with troubled speculation. "You're kidding, I hope."

"I hope so, too."

"Well—here's Bordent. Let's talk to him."

Calderon answered the door. The four little men came in solemnly. They wasted no time. They gathered about Alexander, unfolded fresh apparatus from the recesses of their paper clothes, and set to work. The infant said, "I teleported *her* about eight thousand feet."

"That far, eh?" Quat said. "Were you fatigued at all?"

"Not a bit."

Calderon dragged Bordent aside. "I want to talk to you. I think Alexander needs a spanking."

"By voraster!" the dwarf said, shocked. "But he's *Alexander!* He's Free X type super!"

"Not yet. He's still a baby."

"But a superbaby. No, no, Joseph Calderon. I must tell you again that disciplinary measures can be applied only by sufficiently intelligent authorities."

"You?"

"Oh, not yet," Bordent said. "We don't want to overwork him. There's a limit even to super brain power, especially in the very formative period. He's got enough to do, and his attitudes for social contacts won't need forming for a while yet."

Myra joined them. "I don't agree with you there. Like all babies, he's antisocial. He may have superhuman powers but he's subhuman as far as mental and emotional balance go."

"Yeah," Calderon agreed. "This

business of giving us electric shocks—"

"He's only playing," Bordent said.

"And teleportation. Suppose he teleports me to Times Square when I'm taking a shower?"

"It's only his play. He's a baby still."

"But what about us?"

"You have the hereditary characteristic of parental tolerance," Bordent explained. "As I told you before, Alexander and his race are the reason why tolerance was created in the first place. There's no great need for it with homo sap. I mean there's a wide space between normal tolerance and normal provocation. An ordinary baby may try his parents severely for a few moments at a time, but that's about all. The provocation is far too small to require the tremendous store of tolerance the parents have. But with the X Free type, it's a different matter."

"There's a limit even to tolerance," Calderon said. "I'm wondering about a crèche."

Bordent shook his shiny metallic-sheathed head. "He needs you."

"But," Myra said, "but! Can't you give him just a little discipline?"

"Oh, it isn't necessary. His mind's still immature, and he must concentrate on more important things. You'll tolerate him."

"It's not as though he's our baby any more," she murmured. "He's not Alexander."

"But he is. That's just it. *He's Alexander!*"

"Look, it's normal for a mother to want to hug her baby. But how can she do that if she expects him to throw her halfway across the room?"

Calderon was brooding. "Will he pick up more . . . more super powers as he goes along?"

"Why, yes. Naturally."

"He's a menace to life and limb. I still say he needs discipline. Next time I'll wear rubber gloves."

"That won't help," Bordent said, frowning. "Besides, I must insist . . . no, Joseph Calderon, it won't do. You mustn't interfere. You're not capable of giving him the right sort of discipline—which he doesn't need yet anyway."

"Just one spanking," Calderon said wistfully. "Not for revenge. Only to show him he's got to consider the rights of others."

"He'll learn to consider the rights of other X Free supers. You must not attempt anything of the sort. A spanking—even if you succeeded, which is far from probable—might warp him psychologi-

cally. We are his tutors, his mentors. We must *protect* him. You understand?"

"I think so," Calderon said slowly. "That's a threat."

"You are Alexander's parents, but it's Alexander who is important. If I must apply disciplinary measures to you, I must."

"Oh, forget it," Myra sighed. "Joe, let's go out and walk in the park while Bordent's here."

"Be back in two hours," the little man said. "Good-by."

As time went past, Calderon could not decide whether Alexander's moronic phases or his periods of keen intelligence were more irritating. The prodigy had learned new powers; the worst of that was that Calderon never knew what to expect, or when some astounding gag would be sprung on him. Such as the time when a mess of sticky taffy had materialized in his bed, filched from the grocery by deft teleportation. Alexander thought it was very funny. He laughed.

And, when Calderon refused to go to the store to buy candy, because he said he had no money—"Now don't try to teleport me. I'm broke."—Alexander had utilized mental energy, warping gravity lines shockingly. Calderon found himself hanging upside-down in midair, being shaken, while loose coins cascaded out of his pocket. He went after the candy.

Humor is a developed sense, stemming basically from cruelty. The more primitive a mind, the less selectivity exists. A cannibal would probably be profoundly amused by the squirmings of his victim in the seething kettle. A man slips on a banana peel and breaks his back. The adult stops laughing at that point, the child does not. And a civilized ego finds embarrassment as acutely distressing as physical pain. A baby, a child, a moron, is incapable of practicing empathy. He cannot identify himself with another individual. He is regrettably autistic; his own rules are arbitrary, and garbage strewn around the bedroom was funny to neither Myra nor Calderon.

There was a little stranger in the house. Nobody rejoiced. Except Alexander. He had a lot of fun.

"No privacy," Calderon said. "He materializes everywhere, at all hours. Darling, I wish you'd see a doctor."

"What would he advise?" Myra asked. "Rest, that's all. Do you realize it's been two months since Bordent took over?"

"And we've made marvelous progress," Bordent said, coming over to them. Quat was en rapport with Alexander on the carpet, while the other two dwarfs prepared the makings of a new gadget. "Or, rather, Alexander has made remarkable progress."

"We need a rest," Calderon growled. "If I lose my job, who'll support that genius of yours?" Myra looked at her husband quickly, noting the possessive pronoun he had used.

Bordent was concerned. "You are in difficulty?"

"The Dean's spoken to me once

or twice. I can't control my classes any more. I'm too irritable."

"You don't need to expend tolerance on your students. As for money, we can keep you supplied. I'll arrange to get some negotiable currency for you."

"But I want to work. I like my job."

"Alexander is your job."

"I need a maid," Myra said, looking hopeless. "Can't you make me a robot or something? Alexander scares every maid I've managed to hire. They won't stay a day in this madhouse."

"A mechanical intelligence would have a bad effect on Alexander," Bordent said. "No."

"I wish we could have guests in once in a while. Or go out visiting. Or just be alone," Myra sighed.

"Some day Alexander will be mature, and you'll reap your reward. The parents of Alexander. Did I ever tell you that we have images of you two in the Great Fogy Hall?"

"They must look terrible," Calderon said. "I know we do now."

"Be patient. Consider the destiny of your son."

"I do. Often. But he gets a little wearing sometimes. That's quite an understatement."

"Which is where tolerance comes in," Bordent said. "Nature planned well for the new race."

"Mm-m-m."

"He is working on sixth-dimensional abstractions now. Everything is progressing beautifully."

"Yeah," Calderon said. And he went away, muttering, to join Myra in the kitchen.

Alexander worked with facility at his gadgets, his pudgy fingers already stronger and surer. He still had an illicit passion for the blue ovoid, but under Bordent's watchful eye he could use it only along the restricted lines laid out by his mentors. When the lesson was finished, Quat selected a few of the objects and locked them in a cupboard, as was his custom. The rest he left on the carpet to provide exercise for Alexander's ingenuity.

"He develops," Bordent said. "Today we've made a great step."

Myra and Calderon came in in time to hear this. "What goes?" he asked.

"A psychic bloc-removal. Alexander will no longer need to sleep."

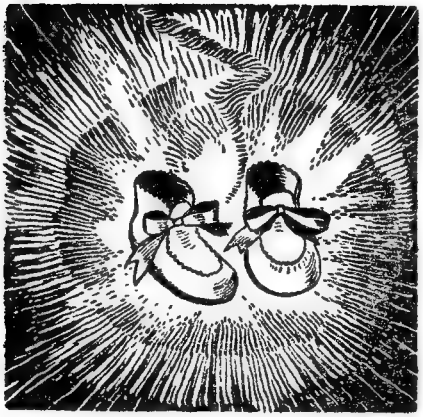
"What?" Myra said.

"He won't require sleep. It's an artificial habit anyway. The super race has no need of it."

"He won't sleep any more, eh?" Calderon said. He had grown a little pale.

"Correct. He'll develop faster now, twice as fast."

At 3:30 a. m. Calderon and Myra lay in bed, wide awake, looking through the open door into the full blaze of light where Alexander played. Seen there clearly, as if upon a lighted stage, he did not look quite like himself any more. The difference was subtle, but it was there. Under the golden down his head had changed shape slightly, and there was a look of intelligence and purpose upon the blobby fea-



tures. It was not an attractive look. It didn't belong there. It made Alexander look less like a super-baby than a debased oldster. All a child's normal cruelty and selfishness—perfectly healthy, natural traits in the developing infant—flickered across Alexander's face as he played absorbedly with solid crystal blocks which he was fitting into one another like a Chinese puzzle. It was quite a shocking face to watch.

Calderon heard Myra sigh beside him.

"He isn't our Alexander any more," she said. "Not a bit."

Alexander glanced up and his face suddenly suffused. The look of paradoxical age and degeneracy upon it vanished as he opened his mouth and bawled with rage, tossing the blocks in all directions. Calderon watched one roll through the bedroom door and come to rest upon the carpet, spilling out of its solidity a cascade of smaller and smaller solid blocks that tumbled winking toward him. Alexander's cries filled the apartment. After a moment windows began to slam across the court, and presently the phone rang. Calderon reached for it, sighing.

When he hung up he looked across at Myra and grimaced. Above the steady roars he said, "Well, we have notice to move."

Myra said, "Oh. Oh, well."

"That about covers it."

They were silent for a moment. Then Calderon said, "Nineteen years more of it. I think we can expect about that. They did say he'd mature at twenty, didn't they?"

"He'll be an orphan long before then," Myra groaned. "Oh, my head! I think I caught cold when he teleported us up to the roof just before dinner. Joe, do you suppose we're the first parents who ever got . . . got caught like this?"

"What do you mean?"

"I mean, was there ever another super-baby before Alexander? It does seem like a waste of a lot of tolerance if we're the first to need it."

"We could use a lot more. We'll need a lot." He said nothing more for awhile, but he lay there thinking and trying not to hear his superchild's rhythmic howling. Tolerance. Every parent needed a great deal of it. Every child was intolerable from time to time. The race had certainly needed parental love in vast quantities to permit its infants to survive. But no parents before had ever been tried consistently up to the very last degree of tolerance. No parents before

had ever had to face twenty years of it, day and night, strained to the final notch. Parental love is a great and all-encompassing emotion, but—

"I wonder," he said thoughtfully. "I wonder if we *are* the first."

Myra's speculations had been veering. "I suppose it's like tonsils and appendix," she murmured. "They've outlived their use, but they still hang on. This tolerance is vestigial in reverse. It's been hanging on all these millenniums, waiting for Alexander."

"Maybe. I wonder— Still, if there ever had been an Alexander before now, we'd have heard of him. So—"

Myra rose on one elbow and looked at her husband. "You think so?" she said softly. "I'm not so sure. I think it might have happened before."

Alexander suddenly quieted. The apartment rang with silence for a moment. Then a familiar voice, without words, spoke in both their brains simultaneously.

"Get me some more milk. And I want it just warm, not hot."

Joe and Myra looked at one another again, speechless. Myra sighed and pushed the covers back. "I'll go this time," she said. "Something new, eh? I—"

"Don't dawdle," said the wordless voice, and Myra jumped and gave a little shriek. Electricity crackled audibly through the room, and Alexander's bawling laughter was heard through the doorway.

"He's about as civilized now as a well-trained monkey, I suppose," Joe remarked, getting out of bed. "I'll go. You crawl back in. And in another year he may reach the elevation of a bushman. After that, if we're still alive, we'll have the pleasure of living with a superpowered cannibal. Eventually he may work up to the level of practical joker. That ought to be interesting." He went out, muttering to himself.

Ten minutes later, returning to bed, Joe found Myra clasping her knees and looking into space.

"We aren't the first, Joe," she said, not glancing at him. "I've been thinking. I'm pretty sure we aren't."

"But we've never heard of any supermen developing—"

She turned her head and gave him a long, thoughtful look. "No," she said.

They were silent. Then, "Yes, I see what you mean," he nodded.

Something crashed in the living room. Alexander chuckled and the sound of splintering wood was loud in the silence of the night. Another window banged somewhere outside.

"There's a breaking point," Myra said in a quiet voice. "There's got to be."

"Saturation," Joe murmured. "Tolerance saturation—or something. It could have happened."

Alexander trundled into sight, clutching something blue. He sat down and began to fiddle with bright wires. Myra rose suddenly.

"Joe, he's got that blue egg! He must have broken into the cupboard."

Calderon said, "But Quat told him—"

"It's dangerous!"

Alexander looked at them, grinned, and bent the wires into a cradle-shape the size of the egg.

Calderon found himself out of bed and halfway to the door. He stopped before he reached it. "You know," he said slowly, "he might hurt himself with that thing."

"We'll have to get it away from him," Myra agreed, heaving herself up with tired reluctance.

"Look at him," Calderon urged. "Just look."

Alexander was dealing competently with the wires, his hands flickering into sight and out again as he balanced a tesseract beneath the cradle. That curious veil of knowledge gave his chubby face the debased look of senility which they had come to know so well.

"This will go on and on, you know," Calderon murmured. "Tomorrow he'll look a little less like himself than today. Next week—next month—what will he be like in a year?"

"I know." Myra's voice was an echo. "Still, I suppose we'll have to—" Her voice trailed to a halt. She stood barefoot beside her husband, watching.

"I suppose the gadget will be finished," she said, "once he connects up that last wire. We ought to take it away from him."

"Think we could?"

"We ought to try."

They looked at each other. Calderon said, "It looks like an Easter egg. I never heard of an Easter egg hurting anybody."

"I suppose we're doing him a favor, really," Myra said in a low voice. "A burnt child dreads the fire. Once a kid burns himself on a match, he stays away from matches."

They stood in silence, watching.

It took Alexander about three more minutes to succeed in his design, whatever it was. The results were phenomenally effective. There was a flash of white light, a crackle of split air, and Alexander vanished in the dazzle, leaving only a faint burnt smell behind him.

When the two could see again, they blinked distrustfully at the empty place. "Teleportation?" Myra whispered dazedly.

"I'll make sure." Calderon crossed the floor and stood looking down at a damp spot on the carpet, with Alexander's shoes in it. He said, "No. Not teleportation." Then he took a long breath. "He's gone, all right. So he never grew up and sent Bordent back in time to move in on us. It never happened."

"We weren't the first," Myra said in an unsteady, bemused voice. "There's a breaking point, that's all. How sorry I feel for the first parents who don't reach it!"

She turned away suddenly, but not so suddenly that he could not see she was crying. He hesitated, watching the door. He thought he had better not follow her just yet.

THE END.

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CRT

(*Continued from page 6*)

cut as to just cover the curve produced, no light will appear unless the object is of the wrong color—has a different color response curve. A photocell can sit around and look at the blank face of such a CRT all day, without daydreaming for an instant—and can work a device to kick off of a passing conveyor belt any unit of the wrong color! Or, by inversion, kick off only those units which do have the selected color-curve.

The complete color curve can be plotted, inspected, and acted on in 1/10,000th of a second if desired. The precision of color match can be made as high as desired, even finer discriminations than the human eye can detect could be made.

The only known device that can plot graphs visibly and instantly, the cathode ray tube has, unquestionably, more applications than anyone today can think up—applications in production-line control, where thousands and tens of thousands of them can be applied to inspect and select millions of units, tirelessly, never becoming bored or careless, with any degree of discrimination the problem requires. Photocells and cathode tubes combined can, and will, do an enormous number of high-speed routine checks that would drive the most placid, the most cowlike human being into a nervous breakdown. And do them at a speed nothing living could match.

That means, of course, that the tubes, quantity produced, will become cheap. The modern radio tube, infinitely finer and more complex than the old broadcast receiver tubes, sells for as little as seventy cents. The CRT, in the 5- to 9-inch size, will sell for two dollars and fifty cents to five dollars instead of twenty-five to seventy-five dollars. The expensive transformers will sell for less than receiver transformers; the CRT needs only two or three watts of power, for all the high voltage involved.

And there is, of course, no reason why special tubes plotting four, five or six quantities simultaneously cannot be made for special jobs. It's customary, of course, to use graphical axes at 90° angles, but 60° axes can be, and have been used.

Plotting complex quantities can be used for analytical jobs, too—as well as production control. A chemist would have a fancy time, for instance, determining whether this alloy-steel bolt were heat-treated or not. Heat-treatment doesn't alter the chemical composition. But it raises Ned with the magnetic properties. A CRT will do a beautiful job of plotting the hysteresis loop of a piece of metal in a coil—and with a plot of the magnetic properties, it's a cinch to separate treated from untreated steel. Or steel ingots containing one percent nicked from ingots containing none. It can separate brasses, bronzes and copper, too. They have magnetic properties—even if no magnet will pick up copper shavings!

THE EDITOR.

Time for a Universe

Time for a Universe

by R. S. RICHARDSON

The Earth seems to be two billion years old. There are a lot of things that seem to indicate the universe itself is 2,000,000,000 years old. But —there are a lot of others that need more time. How old is the Universe?

Photographs from Mount Wilson Observatory.

In February of 1933 two topics dominated the news columns of the Los Angeles papers. One was the depression which was sagging toward the bottom of the Bank Holiday; the second was Professor Albert Einstein.

Of the two Professor Einstein made much the better copy. The citizens of Southern California, who enthusiastically embraced the Epic Plan (End Poverty In California), Ham and Eggs (Thirty Dollars Every Thursday), Townsend Old Age Pension, and Technocracy, also came out wholeheartedly in favor of Relativity. Here was a man who talked like a conjurer except that he did his tricks with mathematics instead of mirrors. At a time when life was a pretty dreary struggle for existence he told us about a magic world where all kinds of wonderful things could happen. And it was *true!* The smartest people said so. As a result, Professor Einstein received an ovation that must have set some kind of a record in a section of the country that has never been noted for its reticence.

Quiet little seminars at the California Institute of Technology and the Mount Wilson Observatory composed of a few dozen earnest Searchers after the Truth were now

covered as thoroughly as a sensational courtroom trial. Peering through the window an artist sketched Professor Einstein surrounded by fellow scientists while they were trying to look unconcerned and concentrate on a lecture about the zero point of the Period-Luminosity Curve for Cepheids. I came to my office one morning and discovered a photographer in the act of shooting Professor Einstein shaking hands with Dr. E. A. Fath of Carleton College in the doorway. It was news when Professor Einstein made a mistake while writing a formula on the blackboard and several members of the audience corrected him instantly. (Who said there were only a dozen men in the world who understood relativity?) The rotogravure section carried photos of Professor Einstein gazing at the Riemann-Christoffel tensor, Professor Einstein meeting the governor, Professor Einstein looking slightly depressed being welcomed by a group of leading citizens, et cetera.

Not only was he feted by the scientific part of the Southland but also by that much better publicized section lying over the hills to the west known as Hollywood and Beverly Hills. Here he was escorted to gorgeous opening-night ceremonies during our Blue-White or Premiere Period. The elite of filmdom eagerly sought his opinion on this and that. What did he think of Shirley Temple? How did he like Mickey Mouse? (It developed later that the only two screen actors Professor Einstein had ever heard of were Mary Pickford and Charlie Chaplin.) I recall listening to the broadcast of one premiere that was a classic. A huge crowd had assembled which the police had difficulty keeping under control. Their enthusiasm swelled with the arrival of each celebrity. The climax came when Professor Einstein put in his appearance. The mob went simply wild. They broke loose, tore up the decorations, smashed the microphone, and generally contributed to the success of the evening.

I think my most pleasant memory is of a meeting which occurred between Professor Einstein and the Abbé George Lemaitre, the Belgian clergyman, whose brilliant paper developing the consequences of universes containing different proportions of matter and motion had attracted world-wide attention. Originally published in 1927 in an obscure scientific journal it had been overlooked almost entirely. Then it was discovered by Eddington, who realized its worth immediately, and had it republished in the much better read *Monthly Notices of the Royal Astronomical Society*. The Abbé Lemaitre, a modest unassuming young man of about twenty-nine, had for several weeks been participating in seminars at Pasadena traveling from one to another on a bicycle, a method of locomotion formerly used only by flippant youths but now employed by some of the flower of Pasadena's savants since gasoline rationing went into effect.

In a brief discussion Lemaitre

had proposed a solution to the problem of the expanding universe in which he envisaged a primitive state wherein all matter was packed into a single huge atom which exploded in a shower of cosmic fireworks, whose tiniest sparks were the star-clouds and nebulae of our present system.

After he had concluded there was brief applause followed by several seconds of silence. The chairman asked if there were any comments. Finally Professor Einstein arose and began to speak in German. There had been some newspaper talk of the "Battle of the Universes" between Einstein's world that contained matter but no motion and William de Sitter's that contained motion but no matter. As a consequence, his words were followed closely although only a few in the room could understand them. What was Einstein saying? Was he defending his own universe and attacking Lemaître's hypothesis? Suddenly the Abbé's face flushed with emotion which he was unable to conceal. A friend sitting next to me supplied the answer. He whispered that Einstein had just stated he considered Lemaître's hypothesis to constitute one of the most thoroughly satisfactory universes he had ever encountered.*

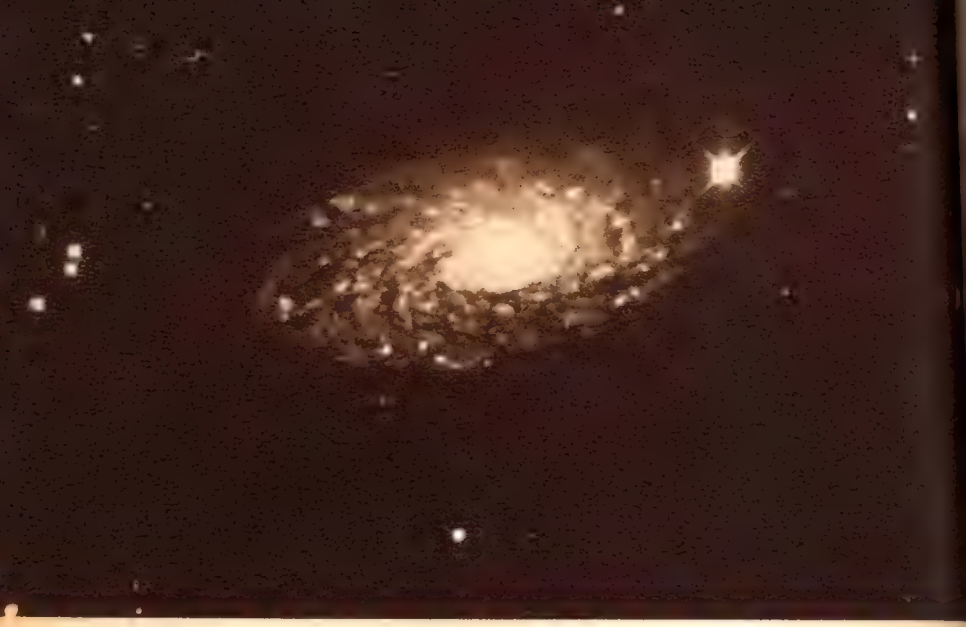
A subject that grew and developed more or less parallel with these cosmological theories is that of the time-scale for the universe. Arguments over the respective merits of different universes—universes that expand without limit, universes that both expand and contract, universes that you can see around if you keep looking for 550,000 million years—have temporarily subsided. But war or no war, the debate on the time-scale goes on as lively as ever. The reason may be because there is some remote possibility of obtaining a definite answer to the time-scale question whereas the universe problem looks pretty hopeless. In particular, you can get answers from so many entirely independent sources.

Briefly, what we are after is something of this sort: how shall we rate our cosmic clock in order to get a time unit of convenient length? Shall we adjust the length of the pendulum to beat thousands of years, or millions, or billions?

For example, it would be inconvenient to give a man's age in terms of months because it is so seldom that he undergoes any significant change in so short a period. Only during infancy does an individual develop rapidly enough to make the month a convenient interval. But a man seen every five or ten years would certainly show marked changes in appearance. For other events shorter units are handier. The changes during a terrestrial magnetic storm—violent fluctuations in the Earth's magnetic

Andromeda nebula at great magnification, resolving central portion into individual star images. On page 99 is a shot of the entire Great Nebula.

* Recently, Professor Einstein was again in the news but for a different reason than in 1933. He had to call in an expert to help him figure out his income tax!



Canes Venatici *is a typical spiral nebula of the extragalactic type.*

field presumably due to sunspots—are given in terms of "Storm Time," or the number of hours after the—usually—sudden commencement of a magnetic storm. Thus geophysicists speak of the sudden increase of intensity at two hours storm time, the rapid fall at ten hours storm time, et cetera. For other events the day or hour is far too long. We might announce that a man had just run the 100-yard dash in 0.00011574 days but ten seconds flat sounds more intelligible over the loud speaker.

During the last twenty-five years the chief arguments have centered over the relative merits of the so-called short and long time-scales. By a "short" time-scale is meant one of the order of not to exceed three billion years, as contrasted with a "long" scale of perhaps five trillion years. Formerly the tendency among cosmologists was to favor the long time-scale on the general principle that it was a good idea to grab all the time available so as to have plenty on hand in case their theories unexpectedly demanded a few extra 100 million years or so. Recently, however, so much evidence has accumulated in favor of the short scale that cosmologists have been forced to trim their theories accordingly. But there still remain several cases that stubbornly refuse to abide by this contracted scheme of things. And until these are satisfactorily ex-

plained neither one can be considered as settled in any sense of the word.

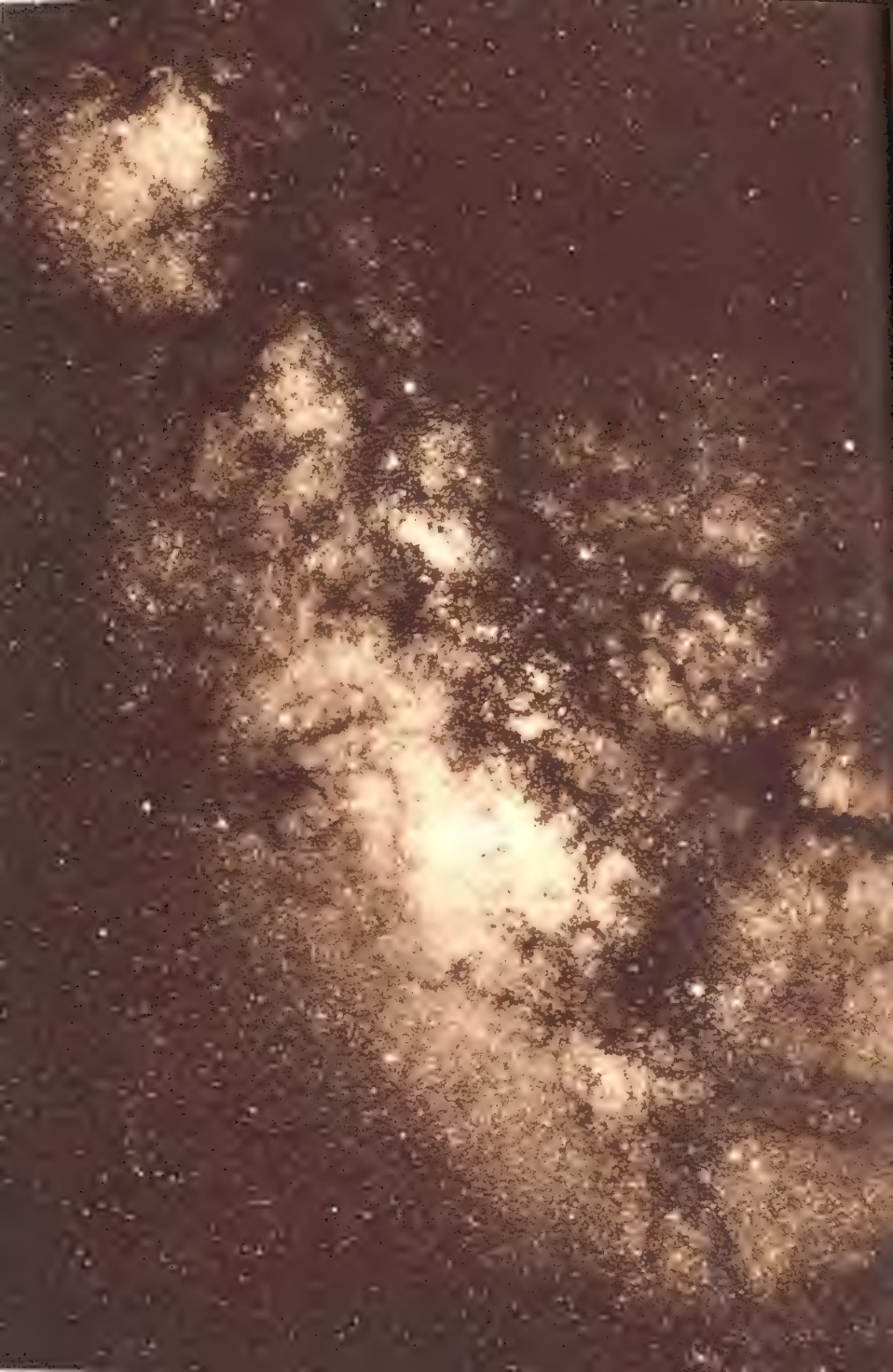
Let us start with what is perhaps the simplest and most direct method of getting at the age of the universe. Photographs of the extragalactic nebulae show their spectral lines are shifted toward the red by amounts indicating velocities of recession that are simply enormous. The fainter and presumably more distant the nebulae the faster they appear to be speeding away. When their admittedly somewhat shaky distances are plotted against these velocities of recession the result is a straight line as nearly as we can judge. This means that the speed with which a nebula is flying off depends directly on how far off it is. A nebula one million light-years distant is receding at the rate of one hundred miles per second—remarkable how convenient that turned out to be!—a nebula two million light-years distant is receding at two hundred miles per second, and so on.

Therefore, to find when the universe started all we have to do is run the film in reverse. The more distant the nebula the faster it flies backward. With the result that they all collapsed together at an epoch 1,840 million years ago when things must have been in a condition resembling that of Washington, D. C., today.

Naturally you are under no compulsion to accept this interpretation of the red shift if you would rather not. Remember, all that we really *observe,* all that we actually *measure,* are the positions of three ragged gaps in a tiny strip of silver grains on a photographic plate about as long as your little finger. You need a pocket lens to see if there is anything on the plate at all. Measurements under higher power show the lines are shifted by about 1/64 of an inch from their normal positions. And from this fact alone we are asked to believe that the universe is blowing up.

Now one of the pitfalls into which the most astute scientist can tumble is failure to see the obvious explanation. The solution escapes him because it is so simple. He builds up an elaborate hypothesis to account for an effect when all the time the real answer is staring him in the face.

For example, practically all the plates upon which the rate of expansion of the universe is based were taken by one man at the 100-inch telescope. The nebulae are so faint that to record their spectra required exposures of from ten to forty hours. Before a special camera with a focal ratio of F/0.6 was installed the exposures ran up to sixty hours. This meant that for as long as forty hours the telescope must be kept centered by "guiding" or making minute changes in its direction to compensate for inevitable errors due to the rate of the driving clock or varying atmospheric refraction. Of course, the exposure is not made continuously but from night to night, the plate being left in the telescope and protected from light during the daytime. Now maybe during those



forty hours something went wrong with the telescope. It wouldn't take much to produce a shift of 1/64 of an inch. Maybe there was something wrong with the comparison spectrum of helium imprinted alongside the nebular spectrum used as a reference in measuring the red shift. Maybe something went wrong with the astronomer himself. Although in this case these suppositions can be safely ruled out, they illustrate the sort of thing it is necessary to keep in mind before announcing a theory of the universe.

In this connection, there is a story told about Robert Kirchoff, the physicist, and Wilhelm von Bunsen, inventor of the Bunsen burner, that is worth repeating. The two were strolling across the campus of the University of Heidelberg one sunny afternoon deep in conversation upon some abstruse subject. As they passed a silver-coated globe set on the lawn as an ornament Bunsen absent-mindedly ran his fingers over the reflecting surface. To his amazement the side exposed directly to the sun was cooler than the side in shadow.

Immediately the two stopped and began excitedly to investigate this anomalous heating effect. Here perhaps was a new phenomenon in heat conduction involving some mysterious interaction between solar radiation and the reflecting properties of silver. While they were busy devising a theory to account for it the school janitor came by and reversed the position of the globe.

"I have to keep turning it around every once in a while on these hot days," he remarked.

The story is pretty good except that it seems doubtful whether a reflecting surface as good as silver would heat up so seriously.

Now let us glance briefly at evidence of a radically different nature that applies particularly to the age of the Earth and solar system.

Uranium, actino-uranium, and thorium undergo transformations into isotopes of lead of atomic weights 206, 207, and 208, respectively, at a rate which is absolutely insensible to their environment. They have achieved that happy state to which we all aspire but so seldom attain of being able to proceed serenely about their business irrespective of what happens around them. Neither extremes of temperature, pressure, chemical reactions, nor great lapses of time can in the least alter the rate at which uranium disintegrates into lead and helium. For this reason it constitutes one of the best clocks for measuring vast intervals of time we have. If a mineral containing uranium is left alone in a rock for a billion years, at the end of that time fourteen percent of the uranium atoms will have become lead atoms. Hence, if we find a mineral which is eighty-six percent uranium and fourteen percent lead of the correct atomic weight, then we know it is

These star-clouds in Sagittarius, *part of our own island universe, are similar to those shown on page 103.*

one billion years old. The process might be compared with that of liquidating a debt at the rate of ten dollars or one percent per month, although the analogy is by no means exact. The length of time the note has run could then be determined merely by comparing the percentage paid—amount of lead formed—with the unpaid balance—amount of uranium left. Thus if the balance is five hundred dollars the note has run for fifty months; if three hundred fifty dollars remains unpaid it has run for sixty-five months, et cetera.

Up to date the oldest mineral found is a specimen of pegmatite from Manitoba, Canada, containing uranium, thorium, and rubidium. The ages derived from these three radioactive minerals come out 1600, 1900, and 1700 million years. The same method has been applied to meteorites yielding values ranging from 0 to 2800 million years with no tendency to cluster around any particular age.

The uranium clock thus points to an upper age limit for the Earth and meteorites in striking agreement with that given by the red shift. The barker on the Midway wants a quarter if he can guess your age within a couple of years. But if we take the values for the Earth only, here we have two estimates of the age of the universe that differ at most by only 300 million years or fifteen percent.

These are at present our two most definite and reliable methods—our first-class determinations, as it were. Are there still other objects that can be made to give us an age for the universe perhaps not quite so reliable — second-class determinations?

From the size of a cluster, its density, and degree of concentration toward the center, it is possible to make an estimate of its lifetime. Dr. S. Chandrasekhar of the Yerkes Observatory thus finds a lifetime of 3000 million years for the Pleiades. And since clusters like the Pleiades are evidently an essential part of the make-up of the galaxy he concludes that their existence implies a lifetime for the galaxy itself of the order of 3000 million years.

Double stars also furnish lifetimes in good agreement with the clusters. Calculations show that owing to the tidal force exerted by neighboring stars binary systems would be pulled apart to such an extent that after 10,000 million years we should expect to find a certain percentage with separations of from 1000 to 2000 astronomical units—1 A.U. = 92,897,416 statute miles—a certain percentage with separations of from 2000 to 3000 A.U.'s, and so on up to 9000 to 10,000 A.U. But the Russian astronomer, V. A. Amberzumian—these names are as bad as chess champions and football players—has found that binary systems in the higher brackets from 7000 to 8000, 8000 to 9000, and 9000 to 10,000, occur far *less* often than if tidal forces had been at work upon them for 10,000 million years. Chandrasekhar, therefore, believes

And this S-shaped Dark Nebula in Ophiuchus *is probably similar to the clouds of obscuring matter seen in the extragalactic nebulae beyond.*

that tidal forces have not yet had sufficient time to take hold appreciably; at the most he doubts if they can have been acting for more than a scant 5000 million years.

The evidence thus obtained from four widely different sources hangs together incredibly well. Summarizing, we have in favor of the short-time scale the following results:

The Uranium clock	1900	million years
Expansion of the universe	1840	" "
Dynamics of clusters	3000	" "
Statistics of binaries	5000	" "
Average	2930	" "

Lopping off the extra 30 million years as inconsequential we get for the age of the universe the value of 2900 million years.

There is no gainsaying the fact

that the champions of the short time-scale who are at present in the overwhelming majority can summon an impressive array of evidence in their behalf. But anyone who attempts to construct a consistent scheme of the universe based upon a fixed time-scale also puts himself into a highly vulnerable position. For if a single object can be found that definitely will not fit in then the whole structure is put in jeopardy. It is like the detective story where the villain plants evidence with meticulous care so as to make his murder look like suicide by inserting a gun in the victim's hand, leaving a note, et cetera, until there apparently is not a shadow of suspicion cast in his direction. Then the detective uncovers the one significant clue he had forgotten to alibi—somebody was left-handed, or color-blind, or forgot to wind his watch—and the whole case collapses immediately.

In the same way, no matter how tight a case the short time-scale people may have built up if we can put our finger on objects that obviously could not have been formed within such limits then all the evidence just cited is subject to question. We won't say "disproved" because in the present state of our knowledge we can hardly hope to prove or disprove anything. Let us now therefore hearken to counsel for the opposing or long time-scale.

We will begin by accepting for the moment the hypothesis of the expanding universe and the alarmingly restricted time-scale which it demands. We also accept the consequence that some two billion years ago intergalactic space, as we know it today, was nonexistent, the nebulae being crowded so closely together as to be virtually in contact. Yet even in this congested state of affairs there would still be ample room for the Earth and the sun, for double stars and clusters, and there would seem to be no valid reason why in the course of two billion years such objects could not have arranged themselves according to their present positions.

In order, therefore, to be able to reject the short time-scale as completely inadequate we must find objects which satisfy two conditions:

1. They could clearly not have existed in their present form in a contracted universe, and

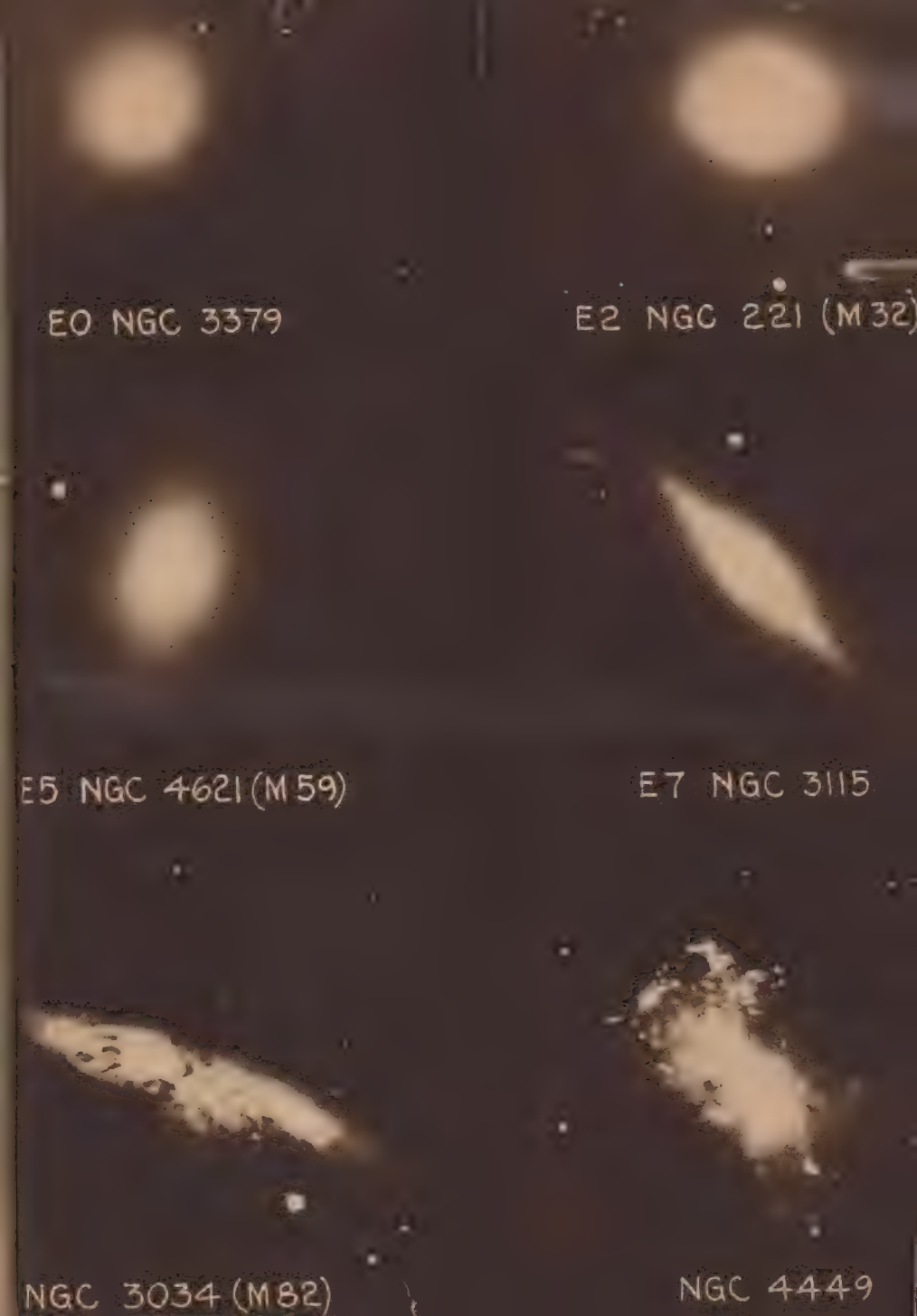
2. Their formation requires intervals of time far longer than two billion years.

It is contended that the great clusters of nebulae such as those in the constellations of Coma Berenices, Hydra, and Perseus satisfy these requirements.

Taking the first condition,* suppose that the nebulae existed in the

* This discussion on nebulae is taken mostly from articles by Dr. F. Zwicky in the Proceedings of the National Academy of Sciences and the Astronomical Society of the Pacific.

These nebulae, save for NGC 4449, might all be taken for other island universes—but each represents a type of non-galactic nebula. NGC 3115 is a ringer for a very distant spiral nebula seen edge-on—but for the total lack of detail feature.


E0 NGC 3379
E2 NGC 221 (M32)
E5 NGC 4621 (M59)
E7 NGC 3115
NGC 3034 (M82)
NGC 4449

contracted universe of two billion B. C. in a highly condensed form. During the ensuing period of inflation the cluster grew to its present size due to the individual motions of the nebulae themselves. That is, nebulae that were originally moving away from the center with the highest velocities should naturally now be found on the outskirts. However, this does not seem to be borne out by the facts. For an investigation of the Virgo cluster reveals that nebulae at the center are moving at the same speed as those near the edge.

As for the second, the way in which enormous masses separated by thousands of light-years will behave under the law of gravitation can be predicted theoretically. Eventually they should arrange themselves into a sphere in a very definite way so that the nebulae are greatly concentrated toward the center. Such an arrangement is called a *stationary state*. It is a state with the highest probability of existence which represents an exceedingly stable condition, one able to maintain itself against outside influence for a tremendous time. You might say that a man who has gotten into a comfortable rut and is satisfied to remain there despite the efforts of his family to make him snap out of it is in a stationary state. The feature about a stationary state that makes it of interest in connection with the age of the universe is the length of time required to get into it. Compared with the short time-scale the interval is as two years is to a second.

Is there a cluster in which the nebulae appear to be arranged as they would be in a stationary state? Yes, the great Coma cluster would seem to satisfy predictions very closely. The following table includes all the nebulae that can be observed per square degree at various distances from the center of the Coma cluster on photographs taken with an 18-inch Schmidt telescope on Mount Palomar. Beside these counts are the number calculated from theory at the same distance.

Distance from Center in minutes of arc	Number Observed	Number Calculated
160′	2	1
140	1	4.5
120	12	10.5
100	23	19.5
80	15	33
60	66	55
50	95	74
40	120	103
30	193	158
20	285	281
10	643	795
5	1431	1763
2.5	2777	2692

Considering the errors to be expected in making such a count the agreement between the last two columns is remarkably close.

Why should it take so long for nebulae to arrange themselves in this way? Because in order to get a bunch of nebulae scattered at random to start condensing around a point they must lose velocity. And the only way they can lose velocity is by colliding with each other. And that is where the rub comes. By far the most probable type of collision is one in which only two

nebulae are concerned. But it can be shown that such a simple collision is not enough. Unless they meet nearly head-on their motion will not be cut down enough to get them started hovering around a center. In order to form a cluster we must have not double but *triple, quadruple, quintuple* collisions. Now it can easily be imagined that waiting for three nebulae to make up their minds to collide would become slightly monotonous, to say the least. Think how many times you have seen two automobiles bump into each other as compared with the number of times you have witnessed collisions among three and four automobiles. Dr. Zwicky has calculated that in a representative cluster 330,000 billion years alone would have to elapse before a single triple collision occurred. And for enough triple collisions to occur to make a well-marked cluster more than a billion billion—1,000,000,000,000,000,000—years would be needed, which is more than 500 million times greater than the puny interval the short time scalers consider sufficient. Here then may be the fatal flaw, the one significant clue, that is needed to destroy the whole case for the short time-scale.

Incidentally, these giant clusters furnish us with a unique test of the law of gravitation. The first application of Newton's formula to bodies outside the solar system came when it was applied to double stars in 1830. It was found to work so well that forever afterward astronomers have unhesitatingly spoken of the formula as Newton's "universal" law of gravitation. But is it. So far we have merely tested it for small bodies separated by a few astronomical units. Will it still hold for huge aggregations of bodies separated by tens and millions of light-years?

We can easily calculate every twist and turn that a planet should take according to the law of gravitation and compare our results minutely with those actually observed. But not so with the extragalactic nebulae. We can scarcely clock them wheeling around their common center of gravity as we do the planets and double stars. It would take a massive shot of time acceleration indeed to make these motions visible.

In fact, we cannot predict *motion* at all. But we can predict the kind of structures the law of gravitation should mold if left to work for immense eons undisturbed in space. And as we have just seen, from study of clusters such as the one in Coma the inverse square law would still seem to hold—for nebulae a million light-years apart or peas in a pod.

In addition to the nebular clusters, there is another type of object that stubbornly refuses to regiment itself according to the short-scale. These are the extremely brilliant super-giant stars at the top of the stellar luminosity diagram such as Y Cygni and 29 Canis Majoris; and the weakly glowing white dwarf stars such as the companion of Sirius down at the bottom.

We now flatter ourselves that we

understand the process that keeps stars like the sun shining. It is the carbon cycle in which a series of encounters starting with a hydrogen and carbon nuclei builds up a chain of isotopes ending with helium and the carbon nucleus ready to start work all over again. Gamma rays given off in the process work their way slowly out from the interior of the star finally emerging mostly in the form of visible or invisible light.

The rate at which hydrogen is converted over into helium with the emission of energy increases rapidly with the temperature so that stars much hotter than the sun must be using up hydrogen at a prodigious speed. Thus Y Cygni which is thirty thousand times brighter than the sun is converting hydrogen into helium two thousand times faster than the sun; while 29 Canis Majoris believed to be seven hundred thousand times as bright as the sun is operating ten thousand times faster. These stars seem to live with no thought for the morrow. And like the famous candle of Edna St. Vincent Millay's that "burns at both ends, it will not last the night," so it is hard to see how the super-giant stars can last for more than 100 million years not to mention a couple of billion more or less.

If the super-giants are in their gay youth, then the degenerate white dwarfs are in their senile old age. After having gotten rid of every source of energy available to a star they have settled down in a highly compact state to await extinction. But this business of using up stellar energy is not something that is accomplished in a single day. For a star like the sun to run through all its hydrogen supply and gravitational energy of contraction would take several billion more years than the meager allotment doled out by the short time-scale rationing board.

If we assume that stars like 29 Canis Majoris are very young and the companion of Sirius very old, we get into difficulty over binary systems composed of a super-giant and a white dwarf. There is every reason for believing that the components of a binary have led parallel lives since their common birth. But to find a super-giant and a white dwarf system would be like finding twins who had matured at such radically different rates that at the age of forty one was still a wee toddler while the other was a doddering old graybeard.

The boldest answer to the question of Why the White Dwarfs was given by the late William de Sitter. He suggested that they are older than the Milky Way, older than the external galaxies, older than anything else in the universe because they *came through* from Outside the last time when space was small. Boy! That is really going backward in time.

As a convenient unit of time suppose that we adopt the one proposed by Dr. Bart J. Bok of Harvard called the Cosmic Year. It is the time taken by the sun to make one

complete revolution of the galaxy. The Cosmic Year is equal to 200 million of our ordinary years.

On this basis, if we adopt the short time-scale, the universe was closely contracted from ten to fifteen Cosmic Years ago. The Earth, stars, and galaxies all were born at about the same time. During the next ten Cosmic Years clusters like the Hyades will have had time to become disrupted due to penetration of intruding field stars and by the tidal force of the central galactic nucleus. Denser clusters like the Pleiades may resist much longer but in the end they, too, are doomed. A one hundred Cosmic Years more and we will search for the familiar Seven Sisters in vain.

According to our present ideas on stellar evolution, the sun should keep increasing in luminosity until fifty Cosmic Years from now it will be one hundred times brighter than at present. By that date its supply of hydrogen will have been largely used up so that the sun will have no other recourse than to draw upon its energy of gravitational contraction. But like a gambler mortgaging his household possessions this is a temporary expedient at best. The gravitational energy is soon exhausted so that in a mere five million years the sun will have dropped from a star as luminous as Arcturus down to the feeble white dwarf stage.

If things keep on as we anticipate at present, by the close of the next five hundred Cosmic Years the end should be in sight. The whole of creation will have sunk into a dull apathetic state in which there is no longer energy available to operate the universe. The radioactive atoms will have run down, the spiral nebulae will have receded from view, and only a handful of faint stars remain. Peering ahead we see nothing but death and stagnation in a world where there is no more hot or cold, up or down, black or white. A period of infinite peace when everything has happened that can happen and there is nothing to worry about any more.

Then the universe will probably start contracting and wind everything up again.

THE END.

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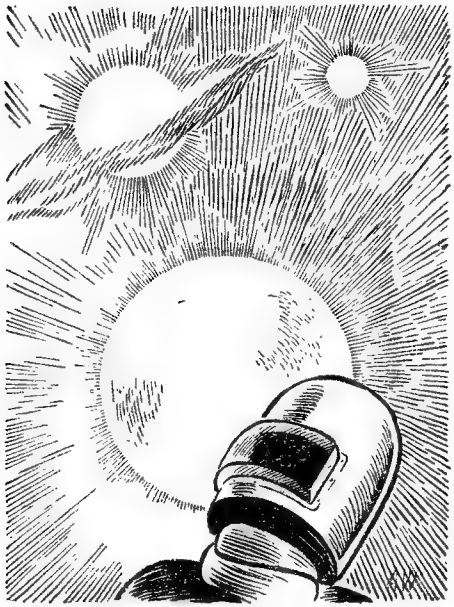


***Those** aliens were* really *alien. As totally different from man as is a cactus plant. Would that difference lead to inevitable extermination war—or complete lack of conflict?*

Alien Envoy

by MALCOLM JAMESON

Illustrated by Williams

The telecom rattled throatily, then cleared. The voice was that of Terry, bimmy fieldman.

"Hey, chief, there's something coming in over the visio you ought to have a squint at. Think it's right down our alley."

Ellwood shoved the file he was examining aside. It was the usual slush about the unrest among the talags of Darnley Valley on Venus and dire prognostications of revolt, as if talag grousing was something new. They *always* bellyached, and nothing ever came of it. That's the way talags were. Anyhow, it

was routine and never should have been sent up to the chief's desk. The ace bimmy—so-called from collapsing the initials of the Bureau of Interplanetary Military Intelligence—preferred not to be bothered with trifles.

"I heard you, Terry," he barked. "Let 'er flicker."

The big screen across the room came to life. For a moment there was nothing but swirling gray chaos, and then the color deepened to a velvety purple-black. The screen gained depth and the coldly burning stars came out one by one. For some seconds that was all, then an object drifted into the field. It was a bulky, teardrop shaped thing of shimmering silvery green and atop it sat a squat turret out of which peeped the blunt nose of some kind of lethal projector. But the violet aura that usually surrounded the stubby gun was missing.

That was but one detail. Ellwood gasped as he ran his eye over the image of the entire ship as it inched its way into the middle of the field of view. The after half of it glowed and sparkled with incandescent lemon-yellow fire, fading slowly to a dull orange and then a cherry-red as the tortured hull radiated its fierce heat into space. The vessel had been caught in a katatron beam. That was evident, but it was not all. There was a gaping hole through the stern out of which glowing gases were blowing, only to be instantly dissipated in the vacuum of space.

"An Ursan!" exclaimed Ellwood. "We finally penetrated one! Who did it?"

"Commander Norcross, in the *Penelope*. He slammed a Mark IX torp into it, and it took. But, say, chief, that ain't all the story. The whole battle was as screwy as could be. The Ursan didn't fight back, and you know how tough they usually are. All it did was set up a terrible howl that sounded like all the static this side of Magellan rolled up in one ball. And take a gander at the co-ordinates."

Ellwood's gaze dropped to the pale white figures in the lower corner. There were three of them—celestial latitude and longitude and the angle of tilt. The wrecked Ursan was less than a million miles away—beyond the moon a little distance and up about twenty degrees.

"What in thunder was he doing this far in?" asked Ellwood. "They haven't ventured in past Jupiter in forty years."

"Search me. That's why I called you. Norcross says he's done his stuff. He's put the Ursan on the fritz, and there aren't any more around. He wants to know whether he should just call the derelict squad, kick the wreck into an orbit, or haul it in so you can have a look-see."

Ellwood fairly yelled his answers into the telecom.

"Park it in the lot by Lab Q-5, of course, you dope. Isn't this what we've been waiting for all our lives?"

The telecom crackled and died. Ellwood's fingers were racing across a panel of buttons.

"Q-5? Standby for a triple-priority job . . . cruiser got an Ursan . . . no, I mean *got* it . . . it's hanging dead in space, and it's fairly intact. They're towing it in to you, and it ought to be there by this time tomorrow. Recall Twitcherly, and be sure that Darnhurst is there. I'm leaving here right now by stratoline and I'll bring Gonzales with me. You have everything all set—complete metallurgy, chemistry, and magnetonic examination of the hull . . . the Valois procedure will be the best, I think. And I want a board of outplanet medicos there. We want to find out what an Ursan looks like, what makes him tick, and the rest. That means an autopsy such as never was, right down to the histology of every last cell in the monsters. That is, *if* they're monsters, and there's anything left of them."

"I get you, chief. Everything'll be ready to roll."

Ellwood snapped out a score of other calls. Then he sat back and relaxed.

It had started out to be a dull, dreary day of stifling details. Now that was changed. It was the day of days, the day of opportunity every bimmy chief before him had yearned for and never got. What were Ursans, anyway? Where did they come from, and what did they want? And since they were aliens from an unknown outer world who always fought back with murderous savagery while being at the same time virtually impregnable themselves, what could be done to improve the technics of warfare against them? It was a grim question that had agitated the Earth races ever since the Ursans had first invaded their system.

Ellwood thought back over recent history. The first intruders had come in a wave of some fifty ships, dropping into the ken of the Space Patrol from the general direction of Ursa Major. On that occasion they visited most of the planets, conducting what was unmistakably a reconnaissance in spite of all the heroic space fighters could do. Dozens of the invaders were caught in the quick blasts of katatrons, but they failed to disintegrate. They merely glowed for a moment in blinding incandescence, and proceeded to carry on. They would answer the kat blast with a bolt of massive pink lightning from their own squat guns, and that would be the end of another terrestrian ship and crew. Until now not one of our vessels had managed to stay in action long enough to launch its slower but more positive torpedoes.

It was strange. The Ursans came, and they went away, leaving behind them the burned out hulks of the flower of the Space Navy. A decade passed, and they did not return. Boasters claimed our defense had taught them a lesson; they would not dare come back. The Pollyannas took the view that it was apparent we had nothing they wanted, therefore they were not to be feared hereafter. But there were others who took a soberer view. The fleet was re-

built and strengthened. Kat pressures were built up; the speed of torps increased. Other weapons were devised under the spur of necessity.

The Ursans did come back. That time they came in not one wave, but ten, and each wave had more than a thousand ships. That was the year of the great running battle from past Neptune all the way in to Jupiter. The Earth forces attacked them at the perimeter of the system and hung on to the bitter end. There were many enemy casualties that time, but the surviving Ursans crowded round them and herded them into what was for them safety—down through the swirling ammonia clouds of Jupiter to a landing where no terrestrian dared follow. The tired remnants of what had been a mighty defensive fleet had no stomach for the killing gravity of Sol's greatest planet. They withdrew to lick their wounds.

For awhile terror reigned on the inner planets. The Ursans did not follow up their attack, but they did not go away. It was evident they were making an advance base on Jupiter. For twenty years their ships came and went, but they did not come inside the asteroid belt again. Doggedly the dwindling Space Navy harried them, but apparently to no avail. In a duel between a Terrestrian and an Ursan, the Ursan always won. It was a dispirited, losing business.

Then came a day when the whole Ursan armada took off in one vast cloud and went back toward the upper Northern sky. Until this lone ship came wandering in, there had not been another visitation.

"I wonder," mused Ellwood, "do these creatures come in successive waves like the Goths and the Mongols and the Huns did, and is this the advance scout for a new invasion? Or what? Why did this Ursan give Norcross time to slip a torpedo into him? Asleep? Sick? Internal difficulty?"

He rose. Well, they had the ship. That was something.

Ellwood leaped from the plane and strode across the field. The bimmy guards saluted and made

gangway. A hundred yards from the grounded wreck Ellwood glimpsed three sheeted forms on stretchers.

"Who are they?" he asked.

"Tolliver, Scwheitzer, and Wang Chiang. They got theirs trying to get into the forepart—passed out in the lock. It's hot in there, and heavy, and what the Ursans use for air is out of this world. It's all over with those three lads."

Ellwood frowned. He didn't relish losing men. Moreover, men with the qualifications for being good bimmies were as scarce as the proverbial hen's teeth. Yet he was glad they had done their duty. If the forward half of the hostile ship was still intact it was important that it be left that way. The easy way would have been to blast it open, but then they would have had to reconstruct the conditions there. This way they had only to observe them.

"Did anyone come out—alive?"

"Yes. Darnhurst. He says there is at least one living Ursan still in there. He saw it crawling around in the control room, and then he got out quick."

"Did it go for him?"

"Oh, no. He just couldn't bear up against the pressure and the rest. There is some kind of gravity device operating in there and inside you have to work against 3-G's. The temperature is around a thousand, and the atmosphere is a mixture of ammonia, methane, helium, nitrous fumes, and about nine other gases that haven't yet been identified."

Ellwood said nothing. A gang of men were just then loading something onto a heavy truck beside the wreck with the aid of a crane. They had brought it out through the gaping hole left by the torpedo. Ellwood walked over and looked at it. It was truly a monstrous thing.

The dead Ursan partook of the qualities of an articulated deep sea turtle, crossed with an octupus and recrossed with a giant horned frog. There were seven segments, squat and heavily plated, each supported by one thick, elephantine foot no more than four inches long. Some of the segments were topped with a cluster of bony spikes, each in a different arrangement. Some were triple, some quintuple, one a simple pair. None were of the same length or thickness, and their spacing varied. The non-horned segments were two in number, one near each end. Instead of horns they were crowned with flat, lumpy superstructures from which dangled a score of octupoid antennae. Some hung lose and flabby, others were half retracted into the parent shell. They were variously tipped at their outer ends. About half ended in handlike arrangements of several fingers and an opposing thumb, others terminated in vacuum-grip cups, still others in horny, toollike finials —chisels, socket wrenches, and the like. But of organs such as the fauna of the Solar System possessed there was no sign. There was nothing corresponding to eyes, ears or noses, nor yet the semblance of a mouth. The creatures were

all plate and horn and tentacle, and incredibly massive.

"How many of these are there?"

"Three. The black gang, I guess they were. They aren't damaged much. It must have been the loss of their atmosphere that killed them."

"Rush them along to the lab, then, and let the boys there at them."

There followed a hectic seventy hours during which no bimmy at that post slept more than a cat nap or ate more than a bolted sandwich. By the time Ellwood's special harness was completed a lot of preliminary work had been cleared away. The easiest part of it was the accessible part of the ship itself.

The hull was of immense strength and built of an alloy that as yet defied analysis. Its tensile strength was of the order of a half a million pounds to the square inch. It was acid proof. It had no attainable melting point. It was a wonder that even a katatron could heat it white, let alone atomize it. Only the direct hit of a Mark IX torp could have punctured it.

The main drive was atomic, not much different from the terrestrial kind. The guns were simply magnetic versions of the katatron. The bimmies whose specialty was ordnance swarmed over them, delightedly taking notes. Here was something really fearsome in the way of armament. The Ursans had learned the trick of accumulating balls of magnetrons under terrific initial tension and then launching them at near the speed of light. But what was radically different was the system of control. No human, or any group of humans that could be contained in either the turret or the engine room could possibly have manipulated the scattered, queer shaped controls. None but Briarean handed creatures could do the job. The set-up was strictly Ursan, by Ursans, for Ursans. Significantly there was nowhere a single gauge, meter, label or other visual aid to the operator.

As for the control room where the surviving monster still dwelt, whining unceasingly on forty different short-wave radio frequencies at once, Ellwood left that strictly alone. He was not finished tooling yet for his entry into it. The only precautions he took with it was to see that a reserve supply of the gases needed to replenish what the monster used was at hand if needed. But he made one startling discovery without entering the difficult chamber. One of his bimmy engineers deduced the location of the monster's air-purifying system and tapped it in mid cycle. The waste product was amazing. It was steam! Just steam. He led it into a condenser. The end product was distilled water, a fact grabbed onto with great interest by the medic gang.

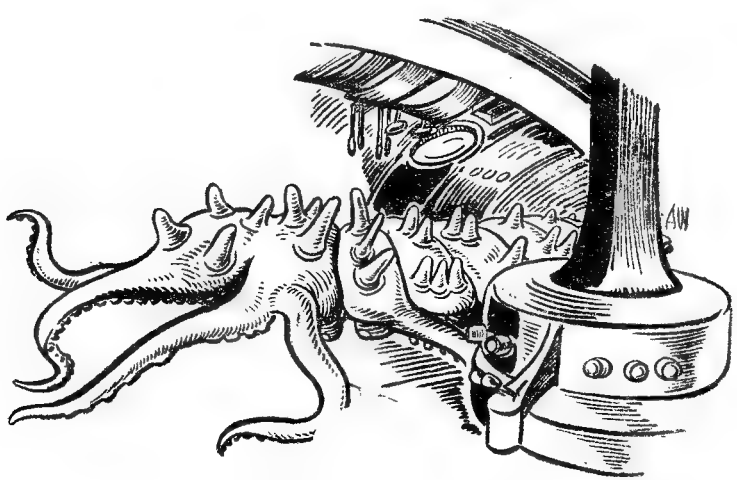
They, too, had done their work, but in the end it had to be taken out of their hands. Electronicists and magnetonic sharks took over where they left off. If the beast's

body chemistry was topsy-turvy, its nervous system was a thing to drive men mad. It was a mess of tangled wire—metallic wire, loaded with radium—and weird ganglia that might have served as distribution boxes. There were sets of flat, semi-bone, metalloid plates that could only be a variety of condenser. There were other screwy arrangements that were probably transformers, and the horns that adorned the spiked segments proved to be combination triodes and sending and receiving antennae. Bimmy after bimmy looked, and bugged his eyes. A thing like that just couldn't be. It violated—well, just about all the laws of electronics there were. Yet— And they would go back to work. What they dreamed of in their snatches of sleep they did not divulge, but it was wild enough to start the doctors shooting hypnophrene as a regular thing.

"There you are," said Gonzales. "It's screwy, but it is what we found."

He handed Ellwood the rough draft of the preliminary report.

The Ursans neither ate nor drank. They breathed—breathed the outlandish blend of gases found in their ship. There were gills under the after edge of each segment's plate except the end ones, and in each segment was a separate lung. The lungs themselves were fantastic beyond expression, an impossible blending of leathery membrane and flexible quartz tubing. In the tubing coursed the creature's blood—a solution of silicon, radium salts, sulphur, iron, zinc, and a score of other metals in a mixture of acids of which nitric was the dominant member. This blood fed the stumpy, clumsy feet and the agile tentacles. It also fed the ganglia and nourished the other electric gadgetry. There were sinuses



filled with the liquid where it seemed to act as an electrolyte.

"If I believe what I see here," said Ellwood tapping the document, "we are going to have to throw a lot of preconceived notions out the window. Here we have monsters with intricate nervous systems, but no brain. Yet they are intelligent, even if they do think with their reflexes. They have no organs of sight, touch, or hearing, but they evidently perceive the stars well enough to navigate, and us well enough to make us targets. This requires a radical approach."

"They perceive by means of short-wave radio," Gonzales reminded him. "That set in the corner is tuned in on the steady drone that surviving Ursan in the cruiser is sending out. I think that is what he keeps track of his surroundings by. Here's why. We have activated the nerve circuits to this pair of horns on number three segment. They gave off the identical continuous tone, and they also pick it up on the rebound. The return impulses go down to a certain ganglia and from there are fed to this set of bone plates. Unless somebody talks me down, I'm going to label those bones the retina."

Ellwood chuckled. It was not too absurd a thought. For centuries men had been using short-wave radio for night detection. Here was a living organism that used it all the time.

"Now these other spikes and horns perform similar, but different duties," continued Gonzales, putting his finger at spots on the diagram. "A current fed to this five-pronged arrangement makes an amateur do funny things when you make noises in the vicinity. I'd call it an audio converter. The Ursans apparently don't care a hang about listening as such, but they evidently have found it useful to change what we call sound into something else that has meaning for them."

"Yes," said Ellwood, thoughtfully. "You're on the right trail. I wonder which frequencies in the band the creature uses for communication with his mates. Once we have that I'll have a jumping off point for what I intend to do."

"We'll see if we can pick it out for you, chief. There are three or four waves he uses only intermittently, and that stutteringly. It sounds very much to me as if he had been listening in on the chit-chat between our ships and was trying to imitate it. Being electronically minded, the Ursans could hardly fail to have picked up our ethergrams. We have recorded a lot of the jabber already and turned it over to the cryptograph gang, but so far they haven't cracked the code. It may be as you suggest—one of those waves is the Ursan speech wave."

"Maybe, and maybe not," murmured Ellwood, "but it's a thought."

That night he made several important changes in his plans. He burned up the air with urgent messages, and before morning the first of the planes bearing rush equipment began dropping down beside

the Ursan prize. By ten Ellwood was ready to test out a theory he had spent the night in evolving. He meant to go into the sealed control room and have a direct interview with the captive monster.

"Better play it safe, chief," spoke up the bimmy in charge of the guard. "That thing may act up. You ought to carry along a blaster."

Ellwood shook his head.

"I think," he said, smiling mildly, "that we got off on the wrong foot with these creatures right from the beginning. I don't mean with this ship or what our gang is doing about it. I mean the whole dismal history of our dealings with the Ursans. I've been thinking it over. Has it ever struck you that there has never been an instance of an Ursan ship firing on one of ours except when ours had first attacked? Could it not be that they are an essentially peaceful race of brutes and not prone to fight except in self-defense? I've come to that conclusion, and I'm staking my next move accordingly. Whatever that fellow in there was up to, coming straight toward Earth the way he was, I refuse to believe it was aggression."

"You're the boss," said the man, shrugging, but the look of uneasiness did not leave his face.

The ponderous chair was ready. It stood on the ground just outside the Ursan entry port, and there was a heavy crane beside it. Ellwood let them dress him in the heavy-duty, high-resistant spacesuit fitted with cooling coils. That would enable him to endure the cruel temperatures so dear to his visitor, and at the same time shield his lungs from the noxious atmosphere. Then he let them hoist him into the chair while they rigged his accessory tools handily about him. The chair itself had been specially built for the occasion. It was massive and mounted on a truck carried by thick dollies, and powered by a small atomic. In it Ellwood could sit in relative ease despite the 3-G pull of the control room deck.

He nodded, and the craanemen hoisted him into the open lock door. They closed it. Ellwood was in the anteroom of the visitor from the stars. The rest was up to him.

The lock grew warm, and the foul atmosphere of the ship whistled in and filled it. The pressure built up. Shortly conditions matched those in the interior. The inner lock door slid open with a hiss, and as Ellwood piloted his sturdy vehicle through it, it clicked shut behind him.

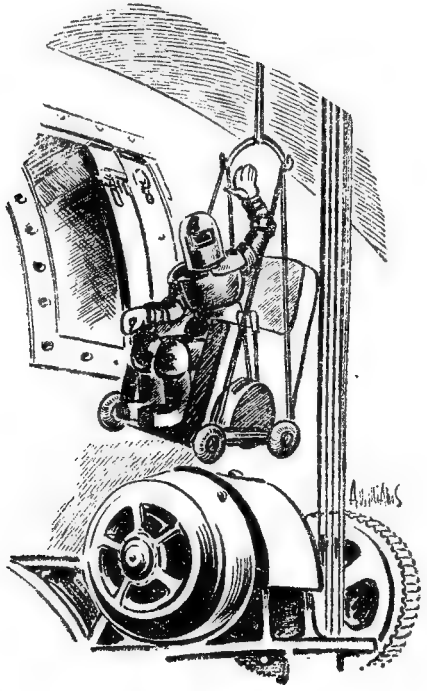
To human eyes the visibility was bad. Ellwood saw everything through a thick, milky haze, but attached to his chair were powerful lights, and after a minute or so he could see sufficiently well.

The control room was a hemispherical affair, a roundish room with a domed ceiling. Except for the floor there was hardly any part of it that was not encrusted with fantastic, intricate machinery. It rose in banks along the curving walls; it hung from the overhead. Only creatures with long multitentacles could have reached its

scattered controls. As a piece of functional design it was doubtless splendid—but from the Ursan point of view. Ellwood swept it with one slow, wondering glance, and then put its intricacies out of his mind. In time the technicians would unravel the mysteries. His job was more comprehensive.

The Ursan lay motionless on the far side of the room. Ellwood could only assume that his entry had been noted. For there was not the slightest sign on the part of the monster of any change in his attitude toward his environment. Ellwood drove his chair part way across the room and stopped it there. He scanned the walls afresh for a relatively flat spot and finally found one—a huge plate that seemed to be the cover for a portion of an elaborate arrangement of magnetic gears. That was well. Ellwood relaxed and devoted his attention to the little black box in his lap. He seized its tuning knobs and began searching the short-wave band.

The two adversaries remained thus for the space of hours. Ellwood simply sat and twiddled knobs, groping for the meaning of what he heard. The monster could well have been as dead as the dissected ones in the laboratory. It never moved an inch or twitched a tentacle. But it kept on doing in-



teresting things with its steady outpourings of radiation.

It was not long before Ellwood was aware that inside him some exceedingly queer sensations were being born. Pimple-raising thrills would creep up and down his spine; elfin fingers reached inside his eardrums and thumped them; once there were sudden shooting pains in his eyeballs; and there was a very trying period several minutes long when his heart action went crazy. Ellwood accepted it stoically. He was sure of himself and felt no fear. He was being probed, examined, mentally dissected by a diffuse electronic mind that felt its way by reflected radiation. He knew his own immense curiosity as to the nature and purposes of the thing opposite to him. It was not illogical that the feeling was mutual.

At last there was a lull. It was time for overtures, the preliminary sizings up having been completed. Ellwood flipped a switch and began sending. *Dot-dash, dot-dot-dot-dash,* and so on, using the wave he thought most likely the creature communicated ideas on. He sent on for one minute, then grinned grimly as he ended with the standard "Over!"

The monster caught on. There was an answering rattle of meaningless *ta-ta-ta-daa-daas.* It made no sense, but the channel had been found. Later the cryptographers could develop the recording tapes and try their hand at unraveling the meaning. But it would not be simple. Spanish is different from Norse, but closely akin—more so, say, than Chinese. Yet all those languages expressed human thoughts in terms of human visual and aural images. How did an Ursan, a creature who had no eyes, ears, or tongue, *think* of the things his "brain" conceived? That was the crux of the problem.

Ellwood was eager to delve into that aspect. It was for that the extra stuff had been rushed through the stratolanes of the night, and he was prepared. For that reason he persisted with the exchange of gibberish only a little while. Then he reached into his bag of tricks and brought out item number two.

It was a small, self-contained, magazine projector. Loaded into it were the excellent films devised by the Outplanet Cultural Society for the education of the Venusian talag, the Martian phzitz, and the odd life forms that haunted the Jovian satellites. Ellwood focused it on the flat plate he was lucky enough to find. Then he started it to running.

The golden key to successful pedagogy is the association of ideas. That was how the OCS had solved the outland language problem. It was true that Ursans could not see, but neither could phzitzn. It was true that a talag is congenitally deaf, but they learned. With an Ursan it would surely be harder, but Ellwood was hopeful.

Nouns, the names of things, are always the obvious starting point. Ellwood's first showing was that of the sun, taken close up, near Mercury. The impressive parade of raging sunspots was there, and

the streaming prominences.

"Sun," he sent, in the interplanetary code, and simultaneously uttered the word out loud. Then he diminished the diameter, showing the sun successively as it appeared on Earth, on Jupiter, and on Uranus. Each time he reiterated the noun, both in dot and dash, and by voice. He repeated the performance from the beginning, then sent "Over!"

"Sun," came back the Ursan's reply. "Over!"

Ellwood beamed beneath his helmet, though hot sweat was trickling over his eyes. The Ursan was smart. He was catching on. Now for another noun, and coupled with it a bit of semantic logic. He started the machine off again, and this time shrank the sun to a mere pinpoint of scintillating white light.

"Star," was his dual message.

"Star," said the Ursan.

Then came the planets, all of them, however different, and each Ellwood called simply planet. After that he went through them again, but that time he put the emphasis on their differences. He called them successively Mercury, Earth, Mars, and on in order. The Ursan followed. Now he was beginning to grasp the human communicative pattern. There were all-embracing words—the generic terms that included a whole class of related things. There were also specific words applying to individual variations.

Ellwood rested. Curiously, the Ursan rested, too. Perhaps he was pondering what he learned, thought

HE GOT
THE PURPLE HEART . . .

WILL A BOND PROVE
TOO COSTLY FOR YOU?

It's left to your own conscience, because that's the kind of country we are. Somewhere else in the world, the money needed to carry on the war would be gotten through added taxes, compulsory savings. But not here. Because we're still free . . . and it's still up to you—and no one else—to decide whether or not your country, or your boy, is worth another bond.

BUY IT NOW!
THE WORLD'S
BEST INVESTMENT!

WAR BONDS

Ellwood. At any rate he waited, motionless and with much of his radiation stilled. Ellwood was convinced now that his plan would work. The monster's perceptions were those of another world, yet they did perceive. That was what mattered.

Presently Ellwood repeated the show, hopeful that this time the Ursan would take another step and supply *his* version of the word displayed. He did not. Evidently there were no corresponding concepts in Ursan thought.

Ellwood let it go. He must be content for the time being with one-way teaching. Later—who knew? He showed next two spaceships. The first was a Terrestrian cruiser, the other a typical Ursan craft. He established one after another the general words "spaceship," "warship," and then proceeded to differentiate into classes. The last lesson of the day was the introduction of adjectives. There were the terms Terrestrian and Ursan to define.

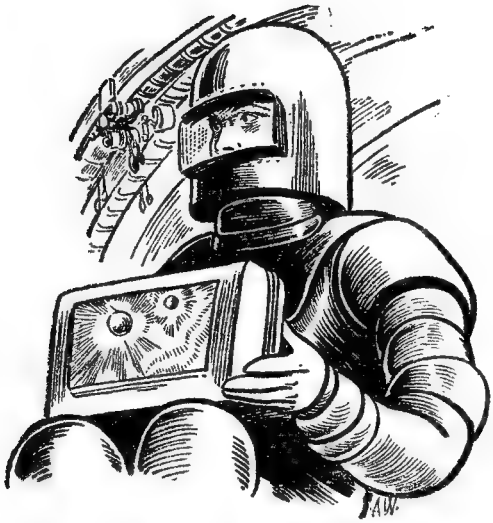
Ellwood was exhausted when he came out, and surprised to find that he had spent but two hours within. It had seemed far longer under the terrible conditions suitable to Ursan life. A group of anxious bimmies hoisted him out of the lock and released him from his harness.

"*Phew,*" he whistled. "Now I understand why a katatron won't work against these babies. They heat up a ship that can't be melted, but what is heat to creatures who start at one thousand as normal? And what is internal pressure increments when 3-G's is standard? I doubt if there is anyway to kill these things unless it is to deprive them of the precious stink they breathe."

He rested most of the afternoon, and then went back. In the tedious weeks of instruction that followed Ellwood made great progress. Where the monster's memory resided he could not say, but there was one. For when he finished with the concrete words he held a review. He flashed the series beginning with the sun, though without naming the objects. The Ursan faithfully supplied the appropriate nouns. He had acquired a vocabulary of more than a thousand words.

The verbs were harder, and the abstractions worse. But the course the Society had contrived was cleverly put together. Ellwood followed it religiously. He depicted various human activities, each neatly illustrated to emphasize the principle concerned. In the end he came to the concept of rivalry, and showed how rivalry grew into strife. Combat was shown in various aspects, but all of it was combat. And then Ellwood played his trump. A scene showing a fight ended in one party crawling across the lines waving a white flag. The two combatants then embraced.

At this point Ellwood got his first reaction from the monster that was more than mere parroting. It was sending agitatedly in English. It was a queer sort of English, tinged as it was with an Ursan accent, for even in code there is such a thing.



The creature got in all the words, but the syntax was his own. Some of the inversions almost defied unscrambling, but Ellwood thought he knew what the Ursan was driving at. He quit sending and listened.

"Peace!" the visitor kept repeating. "Peace. Yes, that is what I came for. We are not enemies, but friends. You are puny yet savage monsters in our eyes, but now that I have seen you at close range I see that you are not wholly bad. You do many things in clumsy ways, but we will pass over that. That is your affair. You are not to blame that your sensory equipment and mentality are as limited as they are, but I now concede that you have done remarkably well in spite of your handicaps."

"Thank you very much," said Ellwood dryly.

Being thanked seemed to disconcert the Ursan for a moment, as it was a concept not hitherto explained. But he took up his harangue again.

"I have been a prisoner in this impossible place for a long time now," sent the Ursan, "and I have listened to your teachings. Very well. Now I know about you and your strange race, and the hideous planets you choose to live on. It's my turn. Let me teach you *our* way. Leave off torturing me with your crude electronic devices and just sit and absorb. I assure you that what you have done to me is quite painful, but in your ignorance you could not help that. I will show you that the Ursan way is better."

Ellwood turned off his set meekly. It had not occurred to him before that mechanically generated radiation might have subtle differences in characteristics from the *organi-*

cally generated variety. He found himself praying that now that it was his turn and he was on the receiving end the converse effect would not be equally painful.

It proved not to be, though there were times when Ellwood felt he would go mad from the exquisite ecstasies that sometimes rose to intensities amounting almost to agony. For the Ursan discarded all dots and dashes and went straight to the source of thought. By means of its own uncanny mechanism it managed to tune in on the neural currents of the brain itself.

It was a dreamlike experience, verging occasionally on the nightmarish. Ellwood had a hard time later conveying some stretches of it to the Grand Council. Indeed, he had a hard time even remembering part of what he experienced, so utterly alien to human conception were many of the bizarre scenes he saw and activities witnessed.

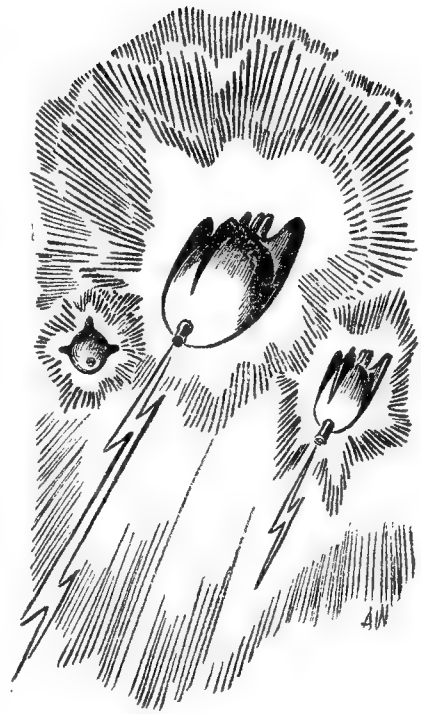
First he had the giddy feeling one has when succumbing to a general anesthetic. It was as if his soul was being torn from his body and forced to float in space. There was never a time when he could be sure that he *saw* what he saw, or *heard* what he heard, or *felt* what he felt. Sensed? Divined? Perceived intuitively? Some such verb seemed more appropriate. But shortly Ellwood quit caring. He was in another world, a world so weird, so fantastic, so amazing in its extremes and distortions of ordinarily accepted laws of nature that he knew that up to then human science had no more than scratched the surface of general knowledge. He saw how chemistry, physics, all the sciences underwent profound modifications under the terrific pressures and temperatures he encountered on certain far off planets. Everything was—well, was *different*.

What the Ursan was giving him was a general orientation course. Ellwood was shown scores of planets compared with which Jupiter would be but small fry. He saw races of other monstrous creatures that were as different from the Ursan before him as the Ursan was from him, yet they lived in the same environment. It was analogous to the mutual enjoyment of the earth by such diverse creatures as eagles, elephants, snakes, man, fish and streptococci. Each had its own needs and duties, though each impinged at some points on the others. There was co-operation among them, and also strife. And what strife! Ellwood grew faint when he saw the fighting modes of some species of monsters.

But there was civilization, comprising manufacturing and commerce, and attended and regulated by a sort of ethic. There were governmental organizations, and what must have been religious bodies. It was the industrial setup with its mighty factories that interested Ellwood most. He saw that on those planets certain substances quite rare with us were commonplace, and also the con-

trary. Gold was abundant enough to be used for roofing, whereas ordinary salt was extremely rare. The geatest dearth lay in the scarcity of radium, a vital commodity since it was to the Ursan what the more important vitamins are to us. It was on account of radium hunger that they had been so insistent on mining the Red Spot on Jupiter, despite our inhospitable reception of their ships.

Imperceptibly Ellwood was brought back from the realm of the distant planets, and was kept for awhile in what can only be termed an abstract state. There were no pictures or sound in that. Only a flow of ideas. The Ursan was pouring the Ursan philosophy of inter-creature relationship into his consciousness. It was not at all a bad philosophy. It was co-operative. It recognized the rights of others to live in their own queer ways, and where they conflicted there existed an elaborate code by which they could be compromised.



At length the Ursan reached his finish. Ellwood was back in his own personality, dazed and tired, but immensely satisfied. He knew, without knowing how he felt, that henceforth intercourse between him and this monster would be easy. It would not be in dots and dashes or words in any form. It would not be simple telepathy, which after all is but the mysterious conveyances of thinkable pictures. It transcended that. It was super-telepathy, made possible by the amazing electro-magneto-neuro current command available to those with the Ursan metabolism. Somehow the raw, basic idea came over all at once. It was amorphous, instantaneous, and beyond logical analysis. But one communicated.

Ellwood knew his task was successfully completed. The wordless message given him boiled down to this,

"We, the rulers of the Armadian planets about the great sun Gol midway between you and Polaris, have looked your system over and find there is a basis for us to work for mutual advantage. We saw that you were in useful occupation of

certain small planets utterly unsuitable for us. We meant to leave you alone, and have left you alone. We also found that you have two other planets, one rich and the other less so, sufficiently large to support our colonies. They are useless to you, and must always be, since your personal structure is so puny and your science elementary. We, therefore, claimed them for ourselves, resisting your ignorant and vicious attacks only in so far as we were compelled to.

"Since I find now that you are ruled by fear, and actuated at times by greed and envy, we know that you will never be satisfied with simply ceding to us what is of no value to you. You want recompense. Very well, at great risk and no small inconvenience, I have come as an emissary. In our part of the galaxy there are many small planets that would be paradisical to you, and on most of them the life forms are even more primitive than your own. If you will grant us unmolested access to Jupiter and Saturn, we will lead you to these trivial minor planets amongst us and grant you equal privileges in return. I am the envoy of Armadia. I offer you a treaty."

"I will convey your message to our ruling body," said Ellwood.

"But it is unthinkable," exclaimed Dilling, chairman of the Council. "Why, think of the risks. How do we know these . . . these *monsters* have any honor? If we allow them to build up immense bases, strip our system of its radium, and nose about at will, it will be but a question of time until they exterminate us. Moreover, it is an ultimatum. We cannot entertain an ultimatum from . . . from . . . from—"

He sputtered off into angry silence, still groping for a word beastly enough to describe the Ursan creatures as he saw them. Ellwood regarded him with quiet contempt.

"It is not an ultimatum," he said, coldly. "Alternatives were never mentioned, though there has not been a time in the past half century when the Ursans could not have seared our inner planets from pole to pole whenever they chose. I have seen their engines of destruction and they are unimaginably terrible. They are asking only that we stop beating our brains out and sacrificing our ships in futile nibbling at their radium convoys. We have had half a million fatal casualties to their three. The inmates of the ships we warmed up were only momentarily stunned. The three they lost they lost in offering this friendly gesture."

"Bah," snorted Dilling. "What is friendly about proposing to rob us of untold tons of pure radium when we put such high value on the few pounds we own?"

"The radium in question," said Ellwood, "might as well not exist as far as we are concerned. Our ships have neither the structural strength or the power to negotiate the gravity field of Jupiter, nor our men the stamina to work the mines

if they could go there. You are playing dog in the manger. Yet knowing that, and our weakness, they have made an offer. They will cede us planets as valuable to us as the radium sought is to them. They do it from their sense of fair play. You will accept the treaty because you have no other choice. They will take the radium in any event and keep on slapping down any cruisers of ours that try to interfere. They offer peace instead, and commerce. Think, you other gentlemen, of what that promises. Inter-systemic commerce, not only astronomically speaking, but between systems of life that are on radically different chemical and physical levels. Trade between the tropics and the cold countries was profitable. Trade between Venus and us and Mars is profitable. Here you are offered a prospect that staggers the imagination."

Ellwood chopped off his speech and sat down. He had said what was to be said. The rest was up to the Council.

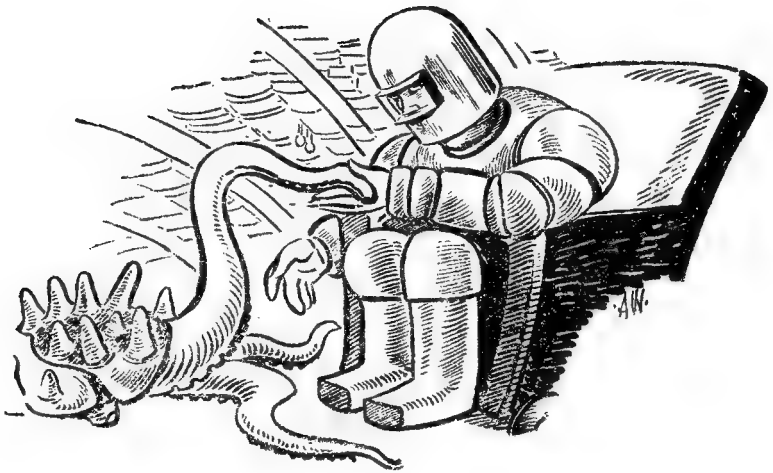
The discussion that followed was heated and lengthy, but in the end common sense won. When he left the chamber it was with authorization to negotiate.

Ellwood approached the Ursan ship for his final interview with the alien ambassador. Shortly he would inherit the interesting wreck for whatever study he wanted to make of it. For the Ursan had broadcast to a waiting horde far out in space that terms had been arrived at. Shortly another Ursan ship would appear, this time with safe conduct, and take his envoy home. Meantime there were the ultimate formalities to be observed.

Ellwood carried with him the English text of the treaty. Both the Terrestrian and the Ursan copies were engraved in basic, systemic English on thick sheets of pure beryllium, a metal totally unknown on the heavy planets. He was to sign with the monster and leave him one set. In his turn the monster was to hand over a copy of the Golic version.

When Ellwood's chair rolled out onto the floor of the control room, the Ursan did what it had never done before. It moved. Inching along on its line of monopods caterpillar fashion, it slowly crossed and met Ellwood midway. Long dormant tentacles slithered out of their sockets and went to work. Two that terminated in the semblance of hands took the beryllium sheets from Ellwood, shuffled them rapidly, and returned them to him. They then reached into a locker overhead and produced a half dozen golden metallic balls. Another tentacle snaked toward a shelf and brought forward an instrument. Ellwood knew, as if by instinct, what he had to do.

The Golic text of the treaty turned out to be the oddest document in the libraries of man. It contained not words, but pure thought—thought impressed on the surface of the strange metallic spheres in the form of regenerative



neuronic charges. To comprehend their meaning any intelligent human had only to run them through the instrument provided with them. It was a scanner, and as the balls rolled through, the hidden message on their surfaces suddenly and mysteriously became clear to anyone nearby.

Ellwood scanned the Golic text. It was a marvel of clarity of expression. The stipulations contained were the whole thought, without a jot of qualification or reservation. One *knew* what was meant. There was no room for quibbling, even if a galaxy of lawyers undertook the task. There were no shades of meaning, or misplaced commas. There were no ifs and buts and and/ors, or whereases or parties of this part and that part as cluttered up the Solar version. The Golic text said what the Solar did, but perfectly.

Ellwood signed it by merely giving his mental assent, which by some miracle of alien science became at once a part of the document. Then he put his own signature to the tin sheets, using a stylus. The Ursan signed in similar manner, but employing a special tentacle that terminated in the suitable tool. What he put down for his name was an unintelligible symbol, but it did not matter. The Solar version would always be subordinate to the Golic. It was an anachroniam, a sop to legalistic tradition, a thing to be filed in archive vaults and forgotten. If ever there should arise a question, the thought spheres would provide the answer.

After the exchange of documents there was a moment of stillness. The two utterly different organisms—the Earthman and the Ursan —were as motionless as if hewn from stone. They were lost in in-

timate psychic rapport. There was gratitude and friendliness in it, and mutual congratulations. Each recognized that the other had done a superlative job, and each understood the purity of the other's motive. Then the mood abruptly faded, as if a connection had been snapped. Ellwood felt completely at a loss as to how he should terminate the interview.

At that instant the Ursan did an astonishing thing. A handed tentacle crept over to Ellwood's chair and rested lightly for a moment on the padded arm. Then it slid forward past the bulbous hinge of the wrist joint of Ellwood's armor and found his gloved hand. The hand-like Ursan tentacle tip grasped Ellwood's hand and shook it solemnly, up and down. Then it dropped away, and retired to its sheath. It was good-by, and good luck.

Out in the lock Ellwood waited for the pressure to fall, and the good, clean, cool terrestrial air to come in. There was a lump in his throat and his eyes were moist, and all of the moisture was not sweat.

"How did that Ursan know we shook hands on things?" he muttered. *"I* never told him. Not once."

THE END.

Statement of the Ownership, Management, etc., required by the Acts of Congress of August 24, 1912, and March 3, 1933, of Astounding Science-Fiction published monthly, at New York, N. Y., for October 1, 1944.

State of New York, County of New York (*ss.*)

Before me, a Notary Public, in and for the State and county aforesaid, personally appeared H. W. Ralston, who, having been duly sworn according to law, deposes and says that he is Vice President of Street & Smith Publications, Inc., publishers of Astounding Science-Fiction, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

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Sworn to and subscribed before me this 29th day of September, 1944. Edward F. Kasmire, Notary Public No. 415, New York County. (My commission expires March 30, 1945.)

Redevelopment

by WESLEY LONG

***Sandra Drake** was a clever girl, but slightly spoiled. A strikingly beautiful woman can get away with a lot of things. But—not when she tangles with an alien race with different ideals of beauty!*

Illustrated by Williams

John McBride hung the phone on the hook and wiped his face. This face-wiping was not the usual gesture of a man whose face is dirty, or covered with perspiration. It was the dazed sort of gesture made by a man who has just been subjected to a surprise, and since the wiping tended to remove the awed look, replacing it with a slightly dazed smile, the surprise must not have been too unpleasant.

He shook his head, as though to clear it, and then made his way through Station 1 of the Plutonian Lens to the landing platform. Just

inside the gigantic lock, a medium-sized spaceship stood, and sitting on the edge of the space lock, swinging her feet, was Sandra Drake.

"Hello," she said brightly.

"Hi," said John. This was entirely new. Sandra Drake was not usually given to greeting men as anything but absolute imbeciles. "What brings you out here? And how did you make it?"

"Oh," said Sandra lightly, "I remembered the charge on Station 1 and brought along a charge-compensator. We hardly sparked when we lit."

One of the attendants said, in a low aside: "About three hundred amperes! She'd call a major explosion a snap of the fingers! You could hide an egg in the crater she made."

But Sandra was still talking. "John," she said in a voice that would have caused Shylock to give her his last gold piece, "I want help."

"You need help? What can we do for you?"

"It's pretty big," warned Sandra. Her low contralto dared him to ask what it was—and also dared him to deny it to her.

"Look, Drake, you did us a favor not too long ago. I think we owe you one."

Sandra smiled uncertainly. "I was afraid that that little stunt was only repaying you for the first meeting we had."

"Shucks," said McBride. "Anyone can make a mistake. Forget it."

"But being pilot for you on the *Haywire Queen* did me a lot of good, too, you know. I got my license back for that one. We both gained."

"I know. I'm glad we did. But what can you possibly want that is so big that you're afraid to ask?"

"Well, and maybe it isn't too big, either. Steve is a friend of both of us, isn't he? I'd do anything for Steve—and wouldn't you?"

"Yes. If any favors are owing, I think it is both of us to him."

"That's what I'm getting at. I need help—for Steve."

"You sure go a long way around to get it," grinned McBride. "Why didn't you tell me that first instead of warning me about a favor?"

"It's pretty big. But look, John, Steve took the *Haywire Queen* on a run to Sirius more than six weeks ago. He took along enough stuff to stay a week; he said he'd be back after one hundred and seventy hours of stay at, on, or near Sirius. This was just a trial hop to try the new drive you cooked up and a longer, better equipped expedition would be made later."

"He did say something about it the last I saw him. He said he wasn't particularly interested in exploring a new system. He'd leave that for the explorers. He was interested in the drive and so on, and after he'd paved the way for getting to the stars and had proven his drive, he'd turn it over to those interested in colonization. But six weeks ago, you say? Gosh, that's a long overstay, isn't it?"

"It is. I happen to know he didn't take more supplies than he

needed. So I'm worried about him."

"And where do I come in? You want me to go and help you look for him?"

Sandra smiled wanly. "Hardly. I'm sure Enid would enjoy that, too. No, John, what I want is for you to hook up the stuff I've got in the *Lady Luck* to make me one of those drives you invented so that I can go myself."

"You're taking a chance, you know."

"That's where the favor part comes in. I want to go and look for Steve Hammond. I need your drive. And if you don't help me, I'll go out in space and tinker with the junk until I get it. I was there when you cooked it up, remember, and I have a good memory for details."

"But it's dangerous."

"Is it? 'Might be dangerous' is what you mean. And I've been taking harebrained chances for a long time, now. Do I or don't I?"

McBride thought for a long time. "You get it," he said at last. "On one condition. That you return in not less than one month. If you do not, I'm going to take it upon myself to follow. So no matter what you find, get back. Is that a promise?"

"It is."

"O.K., Sandra." McBride went to the wall of the big lock and spoke over the communicator. "Tommy! Get Al and Westy and tell 'em to bring their tools to the landing lock. We're going to juggle a few generators around."

To Sandra, he said: "I hope you've got plenty of what it takes."

"I have," she said, sensing his meaning. "Matter of fact, I've got the latest thing in alphatrons—two of 'em. And all the E-grav generators we'll need are all tacked into what I think are the right places to make this crate into a super-speed job. There are spares for all three fields, and a couple of spare cupralum bars, too. Even part of the wiring is done. I got just so far and then realized that I don't know too much about gravitics. That's when I decided to come here for help."

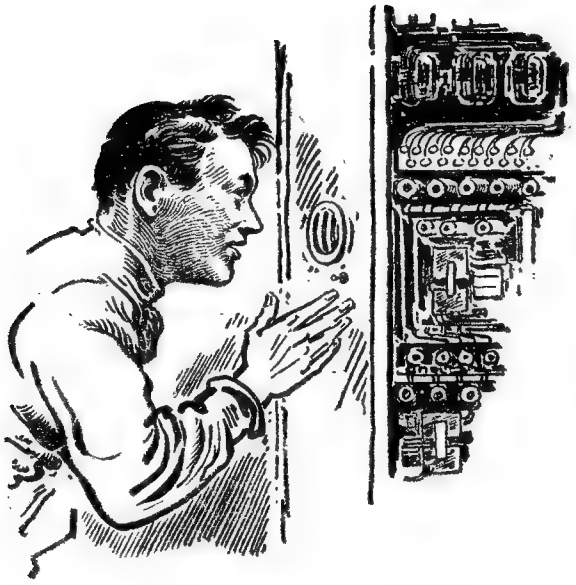
"Good thing," said McBride. "You might have killed yourself."

Sandra didn't answer, and at that moment, McBride's men came with their tools. Wordlessly, they nodded to Sandra and then followed McBride into the *Lady Luck*.

McBride wasted no time. "Al," he said, "you fit the mag-G for vertical bi-lobar field to cover the nose of the crate with the top lobe, and Westy, you see that the mech-G generator in the nose induces the proper vectors in the cupralum bar. I'll get Hank and Jim to touch up the wiring and safety devices. We'll have this crate back in space within the hour!"

"Working a little fast, aren't you?" asked Sandra.

"No. I don't think so. You've got most of the main stuff in place. It's merely a matter of running the alphatron lines correctly—remember, Sandra, alphons are not electrons and even low-alphon lines re-



quire smooth, round bends, otherwise they squirt off in a crackling alphonic discharge that will eat the side out of a steel tank. You've done most of the heavy work. It just requires touching up here and there; getting the proper field-intensity out of the gravitic generators and adjusting the output of the alphatrons. Then there is some tricky relay work with the safety circuits; it wouldn't improve your beauty to suddenly find yourself sitting in the pilot's chair at seven thousand gravities."

Sandra shuddered.

"Oh, and look, since you've got the compensator. You'll find a static-charge meter handy, perhaps. If there are planets around Sirius, who knows what their intrinsic charge is. We'll loan you one so that you can make planet without making a corona at the same time. Rarefied air makes pretty lights when it comes under a few trillion volts—and being a cathode is no worse than being an anode when your voltage is running up into a bushel of zeroes—either is equally disconcerting. How do you intend to spot any planets?"

"I've got a pair of hemisphere lenses. I'll sail through the Sirian sky at about forty thousand miles per second and expose for ten minutes. The stars will still appear as spots, but anything close enough to be planet-wise will make streaks unless it is dead ahead.

"In which case you'll see it personally," grinned McBride. "That's the best stunt I've heard of yet to find planets."

"It isn't new. They used it to see if there were any planets out-

side of Pluto several years ago, though they exposed for several hours while running at ten or fifteen thousand. Steve has a pair of hemis with him, too."

Al came trudging in with a roll of alphon cable over his shoulder and dropped it on the floor. "She's in—my end, anyway."

"Running already?"

"On test power. Drake had the bi-lobar field almost on the ball. Westy found about the same thing. I think another couple of days and Drake wouldn't have needed help."

"I couldn't make it work," complained Sandra.

"Well, you missed a few minor points," said Al. "Never, never run alphon lines anywhere near a relay rack. It induces crosscurrents in the windings and either makes 'em more sensitive or almost dead, depending on the polarity. It won't hurt AC relays, but they aren't used too much on a spaceship, so it's best to play safe."

"I'll remember that, too," Sandra promised him.

"O.K."

And so an hour passed, and another one added to it before the *Lady Luck* was fitted for super drive. It was finished, then, and Sandra Drake was more than voluble in her thanks.

"Never mind the thanks," said McBride, "or we'll be into that original wrangle as to who owes who what kind of a favor. Where we sit out here in the lens, favors are not weighted and set down as an asset. Forget it. G'wan out there and get Steve Hammond—and do not forget for one minute I'm coming after you if you're gone more than thirty days. Seven hundred and twenty hours! Get me?"

"Sure thing," said Drake. "And, John, you're pretty swell."

"Nuts!"

"All right, 'Nuts!' But some day I'm going to settle down and be a good girl, and then you can believe me."

"That, I'll believe when I see it. Go on, Sandra, go out and get Steve."

"I'll get Steve," promised Sandra. "Oh, but definitely."

"Well, good luck."

"Thanks."

The space lock closed, and the men retreated inside of the Station's air lock. The gigantic doors swung open, letting a huge puff of air out into space. Then the *Lady Luck* lifted gracefully for all of her tons of mass, and wafted out through the opened door. It was a dead-center passage, one that could be made only with a master pilot running the board personally.

Then she was gone. Halfway around the lens she would have to go before Sirius came into a safe line of flight. Sandra was taking no more chances on contacting the surface of that mighty space-warp that focused Sol on Pluto.

McBride wondered: *Has Sandra learned her lesson?*

One week passed. One week, filled to the very brim with all of

those routine things that make life full of wonder—as to whether there isn't something better in the hereafter. The sheer millions of miles of gravitic-induced space-warp refracted Sol's light endlessly and perfectly to make for Pluto a synthetic sun that sported a dozen darting points. On Pluto, men lived and worked and pursued happiness, and the valuable ore came up from the ground in the Styx Valley and created the need for Pluto and the lens. Over Mephisto, the smelters cast their glow against the sky, which the inhabitants of Hell always called "The Eternal Fire." Across the River Styx from Hell, Sharon lay like a city of marble by day and a string of pearls by night.

Nor was Hell, as seen from Sharon, any less beautiful. The twin cities of Pluto, rivals in everything, fought as usual. And the bone of contention for that particular week was a simple, age-old epithet. It is a sorry fact that with the entire solar system running as it always did, Sharon and Hell found it possible to make the headlines of all the cities of the system by their arguments.

Sharon lost. Hell succeeded in bringing to mind the fact that Hell, Pluto, was a fine place to be, and the poor citizens of Sharon were forced into second consideration. But then, Sharon had not been a running business for centuries.

Go to Sharon! had no familiar ring.

But the Road to Hell was a broad highway.

McBride looked up as the door to his office opened, and his jaw fell away down to here. He blinked. He looked again, and then jumped to his feet. "She found you!" he said.

"Who found who?" asked Steve Hammond. "Has that dame—?"

"Drake? Yep. She came here and we fixed that drive for her. She's changed, Steve. Even I can see it."

"So she was here?"

"You bet. Sandra has changed."

"Has she?"

"Why, Steve, she was actually worried about you. Near frantic."

"Was she?"

"She may have concealed it from you. After all, she's been a pretty hard-boiled girl and the change is a little abrupt. She's probably concealing her real feelings."

"Would she?"

"Probably. After all she's said about men in general, she's probably fighting an internal battle. But she let it go right here."

"Did she?"

"Did she! Why, she tried to hook up the super drive herself, and when it didn't work, she came here for help. I'd say she was really interested in finding you. Going out of her way to help you, Steve, is quite a difference from the Sandra as I know her."

"Do you?"

"Say! What is the matter with you? 'Has she?' 'Was she?' 'Would she?' 'Did she?' is that the best you can do?"

"Look, John, how long ago was that?"

"About a week or so."

"What did she do, exactly."

"She came here and told us that you've been a month or six weeks overdue on that trip to Sirius. She wanted the drive fixed so that she could go out and look for you. I offered to go along, but she said no. So we fixed her drive and she took off like the devil was in her hair."

"Mac, you're a sucker!"

"Oh, now look—"

"So she's changed, has she? Full of remorse. Sputtering like a leaky alphatron field because she was hamstrung without a drive. Her heart was reeking with love for me, and she wanted, if she couldn't have me, to go out into the deep, unknown void of interstellar space and die where I had died, so we could be together in that last, long resting place."

"What are—"

"So John, please, for the small help I was to you, and for the love of Steve that lies within both of us, give me the drive so that I may go forth and seek he whom I crave. I want so little, John, and Steve is such a fine fellow—"

"Say! Have I been took?"

"The proper word is 'Taken' and the answer is in the affirmative."

"I'll be damned."

"You probably will," smiled Hammond. "Mac, all that dame wanted was to be the first human being to set foot on another, extra-solarian planet! She wanted to be known as the first person to ever seek another star."

"I take it that you haven't been further than a long stone's throw?"

"Shucks. I haven't even been out to the Los Angeles city limits."

"Darn her hide!"

"Yeah. I've been looking for her—and I'm as big a dope as you. I wanted to offer her the chance to pilot the *Haywire Queen* out there. I couldn't find her in the inner system and so I was going to take a squint at Pluto. I stopped off to ask if you'd care to take the run with me."

"You know I would."

"Well, that takes care of both answers. Drake is on her way—shucks, she's there already—and the second part is you—and you want to go."

"I'll ask Enid," said McBride. "Come on, we'll go right down and see her now."

Enid McBride smiled. "His asking me is a matter of form," she told Hammond. "Naturally he'll go. I think it will be swell for him to go. He needs a vacation anyway."

"But—"

"No buts. You'll go and like it. I wouldn't want you to miss anything like this for the world."

"How about you?"

Enid smiled again. "I'm no pioneer type, John. You know that. I'd be out of place—and what would John Junior do? Oh, we could leave him with Anna, if I wanted to go, but somehow this is as far as I care to get from home—my folk's home, I mean. It's funny how after seven years a woman still speaks of her parents'

home as her home in spite of the fact that she has a home and family of her own."

"What'll you do?"

"I'm going to take this opportunity to go home—my parents' home, I mean. You see, Steve, Dad and John talk different languages. Dad is a metal broker on Pluto. The only reason why he tolerated John at all was because John's lens kept Dad in business. Dad wouldn't know a cupralum pig from an acceleration cushion, though he deals in a million tons of the stuff every year. It's all on paper. On the other hand, John wouldn't know how to sell the stuff, but he sure can make it do tricks. So they sit and glare at one another and each one wonders how the other makes a living. Dad's money is obvious, and John's success is equally well-known, but how and why are lost on each other.

"So I keep 'em as far apart as I can."

"I get it," smiled Hammond. "Pretty bad, hey?"

Enid laughed. "This ring is pure iridium. Dad was horrified because he first thought that iridium was radioactive like radium and that I'd get burned or worse. Then he found out it wasn't—and offered to buy a real, honest-to-goodness platinum ring if John couldn't afford it. Then he discovered that iridium is so rare that they do not have a market price per gram and that was all right, but he also confused it with iodine, and worried about its chemical action on my hand. Poor Dad still is not sure about it, so he has to inspect it every time he sees it to ascertain whether or not it is turning green, or my finger is falling off, or that it hasn't sublimed and disappeared. You can't detect the wearing, so Dad then accuses John of either buying a new one every time I come home or making me keep it in a safe while I'm here."

"Cupralum, to Enid's father, is something that he shunts around by signing papers and which, if he shunts fast enough, will increase his bank account, though if the other guy shunts faster, will cause him no end of deficit. Space, to him, is something that you can't breathe, and the stars are little bits of brightness that twinkle on a clear night. Oh, we get along," smiled McBride. "After all, he's Grandpa now, and John Junior is likely to get a slab of Cupralum, Preferred, for his birthday. The kid'll prefer something he can chew on, I'll bet."

"So that's neither here nor there," said Enid. "You take your space hop, and I'll take Little Johnny to Pluto to see his grandparents. Frankly, Steve, I've been wondering just what excuse I could use to run off alone for a month. This makes it perfect."

"We'll stop at Hell on the way back and pick you up," said McBride.

"Fine. How soon are you leaving?"

Hammond said: "Anytime he's ready. How soon can you cut loose from the lens, John?"

"Give me an hour to get things cleaned up and I'll be on the beam."

"Right."

"I'll pack you a bag," said Enid. "Have any preferences?"

"Shirts, shoes, socks, and shaving kit, mostly."

"Want your dinner clothing?"

"Oh sure. And pack my swimming suit, too. Also my tennis racket, and see that the golf bag has plenty of spare balls. Have Timmy wax the skis and sharpen my skates, and I'll also take along the shotgun, a pup tent, the oil stove, a fur coat, a quart of whiskey, six lemons, an orange, a lime, and a bottle of Angostura. Might pack me a light lunch, too."

"Don't bother, Enid. We've got most of that stuff with us," laughed Hammond.

"All right," chuckled Enid. "He'll get one shirt and a bar of soap; one pair of socks, and a bar of soap; and so on—with a bar of soap. Well, keep 'em coasting, Steve, and see that he doesn't run off with any red-headed witches."

"If we see any, I'll bring 'em back for me," laughed Steve. "See you later."

McBride was not as abrupt as he sounded. His business clean-up consisted of dictating a letter, putting all things in the hands of his chief assistant. The rest of the time he spent with Enid, saying good-by. Whatever transpired, whatever they discussed, whatever plans they made—and they must have talked of many things and made many plans, for in spite of the familiarity of running all over the solar system, this was a big step, indeed, since for the first time

in history, man and wife would be light-years apart—they did it well enough in private so that their parting was simple and quick.

John kissed Enid adequately, and said: "Stay healthy."

Enid laughed and said: "Stay whole!"

And then McBride was in the *Haywire Queen* and the air lock was cracked. The big ship lifted gently and zipped out of the lock with a casual disregard for distances. Unlike Drake's precision take-off, the *Haywire Queen* went through the open door with the air of wanting to leave quickly because there were better things to do than worry about hitting the center plus or minus an inch.

Enid pointed out the Dog Star to John McBride, Junior. "That's where your daddy is going," she told him. Junior McBride was more interested in the teething bone that he had clamped between toothless gums, than he was in the stellar regions.

He knew his daddy would be back.

The *Haywire Queen* approached and passed the speed of light from the hard side, and her terrific velocity dropped down to a figure that was expressible in miles per second without running out of zeroes. Below, and thirty degrees from the axis of the ship, Sirius and the Dark Companion beckoned from less than a thousand million miles. The lower dome of the ship sported the faces of the men, who were laying on their stomachs, looking down at the splendor of the first binary ever seen by man. Hammond mentioned it, as a matter of fact.

"How about Drake?" asked McBride.

"We're still the first *men*," returned Hammond.

"Wouldn't Drake howl to hear you say that," laughed McBride. "She's been suffering under the fact that every time she did anything new, she had to qualify it by saying: 'The first woman—' Well, she's got something this time."

"Think it'll satisfy her?"

"Not until someone proves definitely that Thomas Edison, Franklin Roosevelt, William Shakespeare, George Washington, Richard the First, Julius Caesar, and Jack Frost were all women."

"Well, let's get the hemis working. We'll never know whether Sirius has planets until we do. I'd hate to sit in the *Queen* and go through all the growing pains of looking for planets by observation."

"Yeah, that would take years. What's our velocity, Larry?"

Timkins looked at the velocimeter; squinted through the instrument quickly, adjusting the thumbscrew; and then said: "Thirty-four thousand and dropping at one hundred feet per second, per second, per second."

"We can get good pix of anything close enough to the primary to support life—also big enough, too—in about thirty minutes exposure," said Hammond. "We'll take two shots in each direction, since I've got six hemispherical cameras. That'll give us complete

overlapping coverage and double protection against dust streaks. Let's go. Also cut the drive by half."

For thirty minutes the ship plunged on through the Sirian system at the double deceleration. Then for fifteen minutes, the entire personnel was in the darkroom, waiting for the first glimmer of the plates. And at the time that the plates were finished, the velocity of the *Haywire Queen* had dropped from thirty thousand-odd miles per second to velocities normally used in mere interplanetary travel.

The super drive was cut and the ship coasted under standard drive at thirty feet per second, per second, acceleration, and the men hung the plates up in the darkroom and began to inspect them for telltale streaks.

"Here's one," said McBride. "About four hundred million miles from Sirius."

"And another," offered Larry, plying dividers and log tables, "about three thousand million."

"Got another," offered Hammond, "but it's doubtful as a possible landing place. Almost ten thousand million miles from the primary. Bet it's colder than a pawnbroker's heart."

"Couple more on my plate," said McBride. He went to the formerly empty solar map and added the discoveries according to scale. "But that one at four hundred million is my best bet."

"Sounds reasonable," agreed Hammond. "Sirius would support humanoid life at that distance. Let's concentrate on it."

"Good. It's in fine position to be concentrated on. Let's see, now, what should we be looking out for?"

"Might be seetee matter," suggested Larry.

"Good. How do we find out?"

"We don't until the last ditch. But it is the most important, nevertheless. We wait until everything else has been disposed of and then make for the planet. Just outside of the atmosphere we heave 'em a rock or two and watch what happens."

"A slow moving rock?" grinned McBride.

"Doesn't really matter. If it is slow enough to keep from friction-incandescence, fine. But the eruption made by seetee contact is quite a bit different, spectroscopically. Also we can check the explosion with counters. The by-products of such a bit of eruption is full of nuclear radiations. Mere incandescence is just that and nothing more."

"Well, that's that. We can wait. What's next?"

"Radioactivity. How much and what kind? Atmosphere. How much and what kind? Et cetera. Also how much and what kind? Do we intend to land?"

"I don't know. After all, we came for the express purpose of trying out our drive on an interstellar basis, you know. It can be done with ease, neatness, and dispatch. Seems to me that a landing on one of those planets will have to be

made attractive or we won't. We're equipped for all kinds of spacial research, power research, and so on. But we're not equipped for much planetary investigation, exploration, or diplomatically involved intrigue."

"Going to let Drake get away with being the only person making the first landing on an alien star system?"

"I don't give a care what happens to Drake. She can come busting in with the safety valve tied down if she wants to. Some day she'll learn that sticking that pretty little snoot of hers into strange places is a fine way to have it knocked right off of the front of her face. We're interested in technicalities, not in getting involved in a storybook adventure. Meanwhile, let's take it strictly on the easy side and investigate everything from the solar radiation from Sirius to the secondary radiation produced by Sirian radiation in the superstratosphere."

Larry began to fiddle with the radio. There was nothing on the electronic radio at all, and Larry said: "Well, didn't expect it, really. No culture worthy of the name would be using radio in space. Too inefficient. And if they got off of their planets, they'd be using gravitics." He turned to the space radio, and covered the communication bands of the electrogravitic spectrum, switching from band to band quickly. Halfway across the third band, the panoramic tuner came to a definite stop and retraced itself minutely, vacillating a bit until the signal came in clear and clean.

"What happened to Drake?" asked Timkins. "Listen. Here she is."

The gravitic radio was calling: "—*Haywire Queen.* Calling *Haywire Queen.* This is Sandra Drake calling the *Haywire Queen.* This is an automatic transmission set for break-in. As soon as this call gets to you, answer please. The answer will register here and we will be able to make this two-way. This is Sandra Drake—"

"Uh-huh," said Hammond, turning down the gain to a reasonable level. "Larry, shoot her an answer."

Timkins snapped on the transmitter, tuned it to the same band, and said: "This is the *Haywire Queen* calling Sandra Drake. *Haywire Queen* answering Drake. Come in, Sandra Drake. Answer."

They listened to the automatic broadcast for some minutes, and then in the middle of a sentence—"This is Sandra Drake calling the *Haywire Queen—" Click* "Hello, fellows. Got here finally, didn't you? Glad to have you come in. What's new?"

Hammond took the mike. "Hello, Sandra," he answered. "Nothing new. Where are you?"

"On planet number five. That is the one that I think is somewhere about five hundred million miles from Sirius. Know it?"

"We think so. It's dead ahead. Yeah, wait a minute. Larry has a directional bearing on you and it is

the one we're approaching. That takes care of that."

"Well, come on in and I'll build you a cup of tea."

"You find everything all right?"

"Everything's perfect. Only thing, they would like to have someone here that knows all about the gravitics. They're not too sharp. Frankly, neither am I, so you're the guys who'll have to do it."

"You've been there quite a bit," said Hammond. "How's conditions?"

"Pretty good. Air is O. K., though slightly pungent in smell. The people are very much like humans, though they have their big differences which take them out of the human class."

"For instance."

"Well, they are all covered with a funny kind of hair. It's a sort of half-hair, half-feathers kind of stuff. It's as soft as a baby's scalp and on a dog or something like that it would be beautiful. I'd like a coat made of it, frankly."

"I'll bet they appreciate your offer to wear one of 'em for a winter coat," said Hammond dryly. "You haven't changed a bit, have you, Drake?"

"Oh, I wouldn't say that," said Sandra. "After all, I was merely trying to explain the beauty of their skin."

"You gave yourself away," said Steve Hammond. "Like as usual, Sandra Drake thinks of everything in accordance with how it will couple to her, or her name, or her reputation."

"Now, you're being hard," complained Sandra. "Give me a break, Steve. You shouldn't take issue with me for a statement of that kind. After all, it was just a sort of slip of the tongue. I'm not really thinking of skinning one of them for my coat."

"If I were you," put in McBride, "I'd think hard of one other thing that might be closer to home. D'jever think that you are in no position to do any skin collecting? The odds are agin' it. But, Sister Drake, those birds are! You might enhance the beauty of one of their females some day. How would the pelt of Sandra Drake look on the living room floor, nine light-years from Terra? Take it clean and easy, Drake, or you might not get back to Terra with that satiny, soft, practically flawless hide of yours intact."

"What do you mean, 'practically flawless'?" snapped Sandra.

"Well," drawled McBride, "I've never seen all of it."

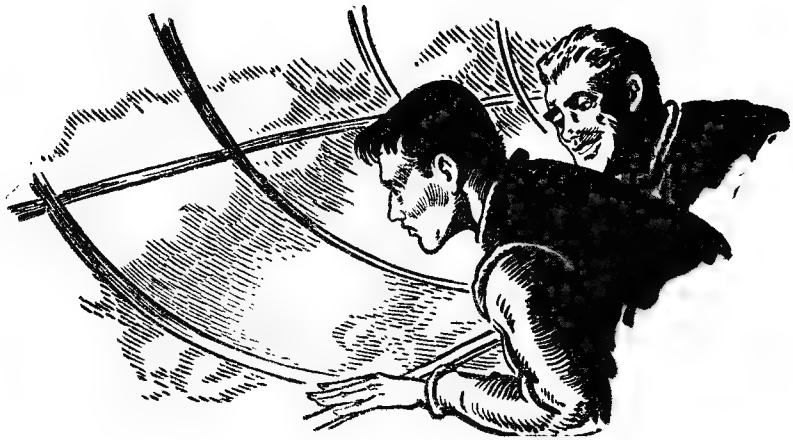
"Why don't you give me the benefit of the doubt?"

"I wouldn't give you any benefit of any doubt," McBride told her. "You're probably concealing something."

"Why—" the radio broke down into a series of liquid, sputtering sounds as Sandra strove to keep that throaty contralto from sounding like a fishmonger's.

"Whistle," chuckled Timkins. "Then count ten. Then let's get back to the problem of the Sirians."

"Take it, Sandra," laughed Hammond. "We were only kidding you. Or—can't you take it?"



The spluttering died, and then that throaty laugh came back again. It was slightly forced and they knew it. The chances are that Sandra knew they knew it, but she didn't want to give them any more reason for laughter at her expense. Then she spoke, directly and honestly, both factors due to the fact that she was sure of herself and now could afford to laugh at them.

"Well, stop worrying about Sandra's hide," she told them. "This gang down here are fine people except that they can't talk Terran. They'll do anything for me that I can make them understand. That's the trouble—getting them to understand. But that's coming. I'm teaching them to speak Terran. That should fix things up fine."

"Why not learn to speak Sirian?" asked McBride.

"Why? Let them do the work. Learning a new language is not Drake's idea of a year's fun."

"O. K., sister," grinned Hammond, winking at McBride. "But you'll find out that there is something to those old adages. I'm thinking of the one that begins 'When in Rome, et cetera.' Those old boys used to dust off some old saws, but there is a lot of meat on them."

"And contradictions. No, fellows, Sandra doesn't like talking in something that sounds like a phonograph record played backwards. Besides, these fellows have a pretty sharp capacity for understanding. I've been here for a week or so, and already they can understand a lot of what I say. Frankly, better than I could."

"Play it your way, then," said McBride. "But look, you say they're nice guys?"

"Sure. When I landed, they gave me the old send-off. I was taken to the royal house and given the prize suite. I'm given everything,

as I said before. They look upon me as the guy who'll give their world the benefit of the Terran and Solarian scientific achievements. That's not true, of course. It'll be fellows like yourselves who really understand it. But nevertheless, I'm the harbinger of spring. I'm the guy who pointed the way for the rest of Sol's children."

"The Moses in the bulrushes?"

"Sort of like. I'm just lucky, and I know it. If I'd come second, they wouldn't pay any attention to me at all. But since I came first and now that I'm talking to my friends, they will obviously think that I'm calling for them to come and help the . . . their world's name is Telfu, by the way . . . Telfans out of their scientific rut. They have the glimmerings of the gravitic spectra, but it's like the difference between the Leyden Jar and the electron microscope. It'd take a hundred years before they got off of Telfu if we hadn't got here first."

"If they're really O. K.," said McBride, "we'll help."

"Thanks," said Sandra simply. "That'll be for me, too, you know."

"Yes?"

"Sure. They'll thank me for coming first, even though they know I'm not the bright guy with the answers under my skull. I've got a good thing here, and I know all of you well enough to know that you won't spoil it."

"No?"

"Sure you won't. After all, there isn't one of you that would care a rap for what they have to offer in the way of historic gain. The old moola, sure; and there's plenty of it to be had for all of us. You'll go down in their histories as the geniuses that gave them a boot in the tail worth a hundred years of solid research. I, and I'm sure you'll permit me, will ride in on the tail of your coat."

"O. K. Well, we'll come in. But not for long this time. After all, we're interested in tinkering with the new drive, not making diplomatic overtures to a bunch of aliens. We'll leave the latter for the Solarian Government."

"How soon'll you be landing?"

"Not too sudden," said Hammond. "We're going to make a few space-checks first. We're getting cautious in our old age."

"Shucks," said Sandra disparagingly, "there's nothing to it at all."

"Well, could be, but we'll run this show our way. There is no objection to your leaving?"

"No. Definitely not. They'd be sorry to see me go, but it is personal affection and the possibility for their ultimate gain that makes it so. They wouldn't dare detain me even though they might consider it. To my knowledge, they haven't even considered it."

"Why wouldn't they dare?" asked McBride.

"Afraid. After all, they know that both of us came from a star nine light-years away. They haven't even got the primary drive, let alone the third-derivative drive. Any untoward move to a Solarian would bring the devil himself down about their ears and they know it."

"I suppose so. We could drop plenty of stuff on 'em with a half dozen space cans. And a couple of monolobar mechano-gravitics would scramble up the works of any fleet of stratosphere planes they could send against us. Never gave the gravitic armament much thought, but it could be done. O. K., Sandra, as soon as we sniff the air and check our gas and water, we'll be in."

"I'm going back to bed, then," said Sandra. "Slip me another call before you land and I'll have the village band out to meet you. That's a promise."

Steve Hammond turned to McBride after Sandra had clicked her transmitter off, and said: "No use checking for seetee matter, is there? Seems to me that Drake would have found it out the hard way."

"No, we can skip the seetee. But Drake may not worry about radioactivity but we will. We'll check for it; I'd like for John Jr. to have a brother or sister some day—with the proper amount of arms, legs, fingers, toes, ears, eyes, noses—"

"What's the proper amount of noses for a son?" asked Hammond.

"One," grinned McBride.

"A kid with two noses could smell a lot," observed Timkins.

"Phew!" said McBride holding his nose. "That was fierce. Man the counter and check the region for hot stuff, Larry. Looks like the landing of LaDrake saves us a lot of work. The physical properties of . . . Telfu . . . seem to be all right. So we'll go to work on the electrical properties, the nuclear properties, and also see if there's anything running around loose in the gravitics other than the inherent mechanogravitic property of matter."

Larry Timkins set up a series of plungers on the control board and locked the pre-set operations into the autopilot. "This," he said, "will hang us on a logarithmic spiral approaching Telfu. While we're roaming around the planet, we'll check the hot-properties of the neighborhood. Any comment?"

"Nope. Give 'em the works."

Timkins drove the coupler button home and the *Haywire Queen* swung gently to follow the pre-determined course.

"You know, Steve, there's a cod-liver-oil smell about this, somewhere."

"So? What's fishy?"

"The old tub isn't behaving like a lady."

"What do you mean?"

"There's a big drop in efficiency compared to when we left the Plutonian Lens."

"How much?"

"Not too much. But it's getting progressively worse."

"Y'don't suppose we've hit upon some saturation factor in the secondary drive?"

"I'm not saying. What do we know about it? What does it work on?"

"Glibly speaking, it works on the inherent qualities of space. We wrap ourselves up in a space warp of sorts, and then shoot out a cou-

ple of hooks that catch on to the gravitic-propagational continuum that permits the planetary masses to exert Newton's Law of Universal Gravitation. It has been called 'sub-ether' but that is like multiplying with unreal numbers. After all, the 'ether' has never been defined, isolated, explained, or held in one hand. If the prime 'ether' has never been satisfactorily established, we shouldn't go on building our houses on a foundation that doesn't have any sound basis."

"Both electronic and gravitic spectra must rely upon something for propagation," objected McBride. "For lack of taking it apart, brick by brick, and feeling each stone, let's continue to call them 'ether' and 'sub-ether.'"

"O.K., sport. But to get back to the drive. Have we got a saturation point? Or some sort of gravitic fatigue? Either of these would be indicated by a gradual decrease in efficiency."

"Larry, set up a sigma recorder and let's see if we can check the curve of inefficiency. It's getting worse, you say?"

"Apparently. I didn't notice it before. But it is quite apparent now. Must be non-linear, because if this falling-off had been linear, I would have noticed it long before this. An increasing curve would not be noticeable until a sufficient interval had been passed for it to become evident. Yeah, I'll slap a sigma recorder on him and see what makes."

"Meanwhile, let's get busy with the detectors."

The counters clicked for a few minutes, and McBride finally reported that Telfu was no higher than Terra in radioactivity. Hammond established the intrinsic electronic charge on Telfu as being only a few million volts negative with respect to Terra.

"Not enough to worry about," he said. "The first touch with the stratosphere layers will take care of that without a glimmer. Wouldn't dare without an atmosphere, but we have plenty of air to cushion the charge and let it leak off in the upper layers where it is ionized by Sirius' radiations. What's with the gravitics?"

"Bit of something in the electrogravitic. Can't place it. Not enough to worry about."

"What is it like?"

"Well, it is not E-grav radiation. It's a sort of dip, or valley, in the radiation-pattern of this part of space. A place where the normal density of E-grav is less."

"How much?"

"You tell me. The free-running gravitons are never high enough to do more than flicker the finest instrument. The threshold is way, way, way, way down in the mud. So here's a place where we have less."

"Sort of like having nothing and wanting to share it with someone?"

"Not much better. Oh well, a lack of free E-grav energy surely isn't anything to write home about. Might be a factor of the Sirian Double. After all, who knows what kind of effect that little, dark-red,

dense-as-hell devil will do to gravitic threshold levels."

"So it's a safe bet—"

Timkins came running in, waving a sheet of cross-ruled paper. "Hell's bells," he yelled. "We're it! Our drive is approaching zero efficiency as the third power of—"

Above, in the working innards of the *Haywire Queen,* great circuit breakers crashed open. Smaller switches added to the din as they clicked open, one after the other. Pilot lights on the polished black panel began to glow an angry red and alarm bells created such a din that speech became almost impossible.

The drive went off.

And the men and their portable equipment left the solid floor and began to float aimlessly across the room in midair.

Hammond clutched wildly at a spectrograph, and caught it.

"Catch!" he yelled at McBride, hurling the heavy instrument at John.

McBride folded himself over the instrument with a grunt of escaping breath. The act did two things. It sent Hammond across the room to the emergency panel in one direction and McBride went in the opposite direction to the navigator's calculating machine. McBride caught the navigator's table at the same time that Hammond caught the emergency panel.

Steve fought with the emergency panel and succeeded in setting up about eleven feet per second deceleration. McBride lowered the spectrograph to the table and seated himself in the chair.

"Woah, Nellie," grunted McBride as the alarm bells ceased. "Where do we go from here and how fast?"

"I dunno, but we're leaving both Sirius and Sol at a terrific velocity and a deceleration of eleven feet per. From a mental calculation of the fundamental drive at this velocity, I'd say it would take about fourteen years to get down to a stop."

"What happened to the emergency relays?"

"They worked," said Steve dryly. "Yeah, they worked. But the inefficiency extends to the fundamental drive, too, it seems. I'm beginning to think that this is not inherent."

"That's a quick decision."

"Sure. But the prime drive is O.K. The meters say so. It's just inefficient as the devil which is not true of a good drive. Holy smoke! We're getting efficient again!"

Timkins picked himself off of the floor painfully. "Uh-huh," he grunted. "Also, we're leaving Telfu behind at a fierce rate. Can you keep that eleven feet prime acceleration for a bit?"

"We're going to."

"I'm going to dash madly upstairs and hang the sigma recorder on again. Something is slippery here."

"What's our velocity at the present time?" asked McBride.

"Up in the fifteen thousand miles per second," answered Hammond.

"Hm-m-m. Then at what point

with respect to Telfu did the drive go out?"

"About a million and a half miles, roughly."

"A minute and forty seconds from spot to conjunction," mused McBride. "If, little playmate, we can get power again after one more minute and thirty seconds-odd, we'll feel more or less sure that it is Telfu and not us. Larry!" he yelled. "Any sign of upswing?"

"Yup," said Larry. "Sure thing!"

"Set the super drive up on test power with automatics to turn it on as soon as the overload point is passed," said McBride. "We won't blow any fuses with test power."

Hammond hit the test buttons and then settled down to wait. Then the drive cut in again, and they all slid down in their chairs.

McBride grinned. "They must not like us."

"Something must not," laughed Hammond shakily.

"Telfu?" asked Timkins entering with the last sigma curve.

"What does it say?"

"We passed through a negative peak. We hit a new low in efficiency at conjunction with Telfu."

"How much?"

"Less than a half percent."

"Jeepers. That is a new low in gravitics. Can we think our way out of this one?"

"Why?"

"As much as I dislike seeing Drake, I'd not force her to live on an alien planet. I'd feel better at marooning her for a couple of years if I knew we could go in and get her."

McBride laughed. "Got to have the last laugh, hey?"

"Meaning?"

"Marooning her wouldn't be half so much fun if it is impossible to get her out. Marooning her when

we have the means to get her out puts it strictly in our own lap. Right?"

"I suppose so. We could laugh at her honestly then."

"She's strictly a stinker," agreed McBride. "I get that cod-liver-oil smell now. All that soft soap and palaver she was handing out about our being the boys with the brains. We were the guys who would be responsible for lifting a struggling civilization up from the primordial slime by our brain and our genius. Baloney!"

"I get it," growled Hammond. "She's stuck. God knows how she landed—probably emergency and shot her load of battery juice. Anyway, she could land under emergency battery, but taking off is a megawatt of another color, battery-wise. They aren't equipped to make a take-off. Idea being the old one—don't start if you can't stop."

"She's a bright girl in her own stinking way," said McBride. "She's been around this gang long enough to know that if a way is possible, we'll think of it. Oh, sure, that's a brag but we've done pretty well so far. So inveigle us into the same trap she's in and then ride out with us. She'd roast in the brimstone of the nether regions before she'd wail for help honestly. But if we get stuck with her she's got two outs. One, we may be able to think our way out. Two, at least we are Terrans like she is."

"Meaning?" asked Hammond darkly.

"Frankly, Sandra Drake is an awful lot of woman, and she knows it. She'd make a plaster saint turn to whistle at her if she turned on the old charm. And with no competition, we'd be fighting one another for the privilege of polishing her shoes."

"Fine future."

"No thanks."

"I'll have a bit of that, too. Well, how can we slip her the old triple-cross?"

"Steve, you'd throw a woman to the lions?"

"With that woman, I'd hate to do it. The S.P.C.A. would haul me in to court for subjecting poor, dumb, defenseless lions to cruelty and inhuman tortures. You're darned right I'd heave her into the drink. But I want to do it in such a way that Sandra Drake will know that it was far from purely coincidental."

"O.K., Steve. We're with you. Larry, throw the *Haywire Queen* into an orbit around Telfu just outside of the danger zone and slap another recorder on the drive. Make it a high velocity orbit, powered all the way. We should be able to circle Telfu in about fifteen minutes with the super drive. Check?"

"Sure. Here we go."

"Meanwhile, Steve, we'll check a few items on the drive itself. I'm beginning to suspect a huge and celestial soak-up of gravitic power in the region of Telfu."

"We can set up the small, experimental drive-model complete with power recorders, spring bal-

ances, and torque measuring devices and work on that."

"Swell. That's the ticket. Let's go."

Hammond hauled the model from the cabinet and plugged in a complex cable from the master control panel. He juggled the dials until the gadget started to work, and then they began to check the efficiency of the device.

McBride muttered: "Power generating equipment is running O.K."

"Yeah," agreed Hammond. "Everything's on the beam from the explosion chamber to the inverted alphatron. We've got plenty of potential power handy. Larry, zoop in close and check the power equipment on a pure, resistive load."

"You mean shut off the drive and coast through the zero region with no drive and with the gravitron running at full output on resistance load?"

"Right. This fishy smell has a rare odor. I think we're on the trail of it."

"O.K., Steve. Can you wait about three minutes? The first encirclement of Telfu will be over then and we'll have our first experimental curve."

"We'll wait."

The sigma curve was completed, and Larry circled far out and made a fast run toward the planet, in a course similar to the one they used on their first try.

Meanwhile, Hammond looked at the curve and grinned.

McBride looked over his shoulder and grinned, too.

Hammond slapped the curve down on a drawing board and began to plot efficiency against a polar co-ordinate. The curve was roughly circular, but exhibited a tendency towards a cardioid. McBride played with the figures for a minute, and as he opened his mouth to say something, the *Haywire Queen* gave that sickening lurch and changed abruptly from super drive to the emergencies.

"Darn!" said McBride. "This everlasting acceleration changing business is going to make a nervous wreck of me yet."

"Also physical if it is taken in too large doses," grinned Steve. "The human anatomy can accept velocity without limit—well, up to the point where the ultimate velocity is reached. We've gone a goodly hunk of stuff over the speed of light."

"That's questionable."

"We came over from Terra in a lot less time than light. That'll be arriving nine years from now."

"Uh-huh. But don't forget we wrapped ourselves in a space warp and ran the space warp. I think that we can safely assume that the warp is another space and that we were not traveling better than the speed of light with respect to our own space."

"Whoof! What a theory! Drag that one past again, slow enough so I can climb aboard."

"You got it," laughed McBride. "And if it smells, you fling out a better one for us to shoot holes in."

"O.K. But to get back to velocity, the human anatomy can stand

velocity without limit. Period. Argue if you like, Mac, but that's my statement. No one has ever been able to prove that velocity alone is harmful to man, beast, bird, or fish!"

"I'm as silent as the tomb."

"Acceleration can be adapted to —in meagre doses. A man can stand up under 4-G. On his tummy, lying down, 8- or 9-G isn't too hard on him. Dunk him up to the breathing-vents in a good grade of oxidized hydrogen and 15-G is possible without too much harm."

"Yes, O Learned Scholar."

"But, students," said Hammond standing up and taking a bow. He was interrupted by the resumption of the super drive which, being set at ninety feet per second per second apparent instead of eleven feet, caught him off balance and almost dropped him on the end of his nose.

"What I was saying," laughed McBride, "was the effect that rates of change of acceleration have upon the anatomy."

"As I demonstrated," grinned Hammond from the floor, "it is changes in acceleration that cause havoc. It causes jerks—"

"To sit on the floor," chuckled McBride. "Get up. Stop playing on the floor, Steve, and take a squint at this curve. Plotting an exponential factor for the ordinates of the graph, using Telfu for the center, we find a locus of equal power-soak-up out here—which I estimate to be a little more than two hundred thousand miles!"

"Ah, the wonders of analyst," said Hammond. "With a defunct drive and a wild idea, Jawn McBride hauls a satellite out of the sky and plants it— Here!"

"What do you think?"

"Who am I to argue with people who understand the mysteries of A to the Xth power equals zero, divided by the date of the month times the ace of spades, equals eleven o'clock. All joking aside, Mac, it looks right to my uninitiated mind."

"Does, hey?"

"Sure. That means that said moonlet—I say moonlet because our pix show that Telfu hasn't anything worthy of the name of a full, honest moon—must be high in cupralum."

"Sort of hard to believe."

"Yeah, but not impossible. It's quite believable that the right alloys should be found *au naturel*, so to speak. There's nothing tricky about cupralum. Mix it together and smelt it down—*voila!*—cupralum. A totally useless and good-for-nothing alloy prior to the discovery of the gravitic spectrum."

"Must be fairly large," suggested Timkins.

"Sure—according to man-made standards. Celestially, it might be a mere scrap of dirt. A sub-sub-sub-microscopic bit of cosmic dust less than a hundred miles in diameter."

"Ugh," grunted Larry. "You make man and his works sort of insignificant."

"We are. Do the planets care what we do on their miles-thick hides? Do the suns care that we

wonder at them? Does the cosmos give a rap that we chase from planet to planet and from sun to sun?"

"You make it sound as though they are capable of thinking."

"If they did, we wouldn't know about it; and they wouldn't know we existed. Proportionally, man is smaller than the filterable virus. So we have a slab of cupralum, which is—according to Mac—Here! That's fine. It blankets Telfu like a complete shroud, as far as the good old gravitics go."

Larry Timkins looked up from a page of scrawled equations. "A slab of cupralum a hundred miles in diameter, rotating in the mechanogravitic field thrown out by Sirius would certainly soak up every bit of power. Must be a slick tie-in. The gravitron puts our O.K. on a resistive load. Hooked to the drive, everything goes *phhht*."

"Sure. That's part of the trouble. It's the drive, coupled with the general gravitic interference cut up by Soaky."

"Soaky?"

"I have hung a name on the satellite. Heretofore it has been nameless. We have named it *Soaky*."

"There is a slight discrepancy between this cardioid and the calculated curve," said McBride. "Obviously, the cusp would be on a line between Telfu and Soaky, projected from the sattellite through the planet to the far side. We orbited around the planet and were closer to Soaky on the side he was on—"

"Is that syllogistic reasoning?" asked Hammond. "Or sheer conjecture? How about shadow?"

"This is quite a wide effect."

"Any shading of Soaky's sphere of influence would tend to deepen the cusp like that. That cardioid is such a curve; there's no reason to doubt that Telfu would tend to shade the field."

"Larry. Can you calculate the field absorption of a standard model planet with the above figures?"

"The attenuation?"

"Yes."

"Sure. It'd help if I knew the chemical components, mass, physical constants, electrical properties, gravitic properties, and nuclear emanations. How close do you want it?"

"Plus or minus twenty percent."

"I can give that to you without calculating," said Timkins. "Telfu is similar to Terra within twenty percent. Terra's attenuation amounts to twenty-nine percent; in other words, the attenuation due to the presence of Terra in the light-line between source and measuring device is twenty-nine percent greater than it would be if Terra were not there and the spacial attenuation only cut the strength."

"Thirty percent, roughly, because it's easier to figure," said McBride. He made calculations, set them down linearly as to the magnitudes, and then transferred the vectors to the curve.

"That's one large bit closer," he said. "We'll better that, some day. But for now, playmates, I've had my Idea-for-the-Week. Let's cut

us another caper around Telfu at right angles to this curve. One side will pass the peak and the opposite side will cut the cusp. Same distance, same speed, same everything. Follow?"

"At some distance."

"I believe that we will find a place where the cusp really comes down closer to Telfu," said McBride. "How much drive inefficiency can we tolerate and still lift?"

"From Telfu? Not enough to keep the breakers from blowing. And don't say wire 'em shut. They're right on the ragged edge now, on account of we know what we're doing and do not want to blow circuit breakers during experiments unless they are really in trouble. But the gravitron-cupralum driving equipment is not our only ace in the bucket. The emergency batteries, though inefficient, can still put us down and get us off. Providing, of course, that your map there gives us a chance."

"Not knowing the orbital constants of Soaky; the plane of Soaky's ecliptic; the rotational features of Telfu, we are taking chances. One rotation of Telfu might be plenty safe if we hit it on the nose. Two might put us out here and then we'd have to go through seven years of astronomical investigations before we found the place where that cusp came in again—and we'd probably have to wait anything from sixteen to nine thousand years before Soaky passed overhead again. The latter might get boring. But we

can take a chance on one day, plus whatever angular movement Soaky makes with Telfu as center."

"Think Soaky's ecliptic is fairly close to Telfu's equator?"

"Within twenty or thirty degrees. I'm assuming the old theory of the Planitesimal Hypothesis. Sling out your molten stuff, let it condense, and you'll find everything rotating in the same direction in about the same plane. Might be clockwise or counter-clockwise, but only one way per solar system. One moon in all of the junk that goes around Sol is contrariwise—and they think that was a captured wanderer. The greatest obliquity is somewhere near forty degrees, most of the large planets being less than ten, I think."

"Celestially, I believe it may be impossible for a satellite to hold an orbit whose plane is vertical to the planet's orbit. I've never given it any thought, but it sounds dan-

gerous to the satellite. Also, Sirius' tidal drag would tend to bring all the planets' axes into vertical line, too."

"Oh the devil. I want to land. If waiting overnight is dangerous, we'll slide in there and out again inside of an hour. But, darn it, I want to plant my number eleven EE's on that planet. Anyone agree?"

"Anyone who doesn't like the idea may get out and walk," said Hammond. "Hold your hat, fellows. Here we go again—"

Sandra Drake reached out of her luxurious bed and pulled a cord. She did it in a languorous move, like a lithe and lazy cat. She did it with a sort of God-given right to do so, and her expression was one of deep self-delight. Whatever she got from Telfu, they owed to Sandra Drake—

Her second pull on the call-cord was more of an impertinent yank. Her self-delight changed to exasperation that they should keep her waiting. Yet she would forgive them, for they were ignorant, in forgiving them her grace would be more evident. They would love her the more for forgiving them their sins of omission—

Sandra's third pull caused the collapse of the call-bell box, and the cord fell, landing in long, graceful loops over her outstretched arm.

Sandra rolled out of bed and threw the cord across the room, where it draped itself about the throat of a marble nude of a Telfan woman. It could not have been placed there with more delicacy; adding just the right touch of decoration to the nude. The center of the cord depended across the chest of the statue in a graceful loop, the bottom of which crossed just above the upper pair of breasts. The ends of the cord passed once more about the throat in opposite directions, and the ends crossed the looped center to dangle between the lower breasts.

The decorative touch did not strike a responsive chord in Sandra Drake. She wanted rip-roaring action, not interior decoration. So she stamped over and jerked the cord from the statue and tried to rend it in her hands. She was not strong enough to do the cord any damage but she did succeed in breaking a one-inch fingernail.

She stormed and stamped, and said a few things that are better mentioned in the abstract, including references to the statue's maker and his family for several generations coming and going. To Sandra's Terran-minded ideas of beauty, the statue was an abomination in spite of its perfection of workmanship. It was not merely un-Terran and therefore strange, it was almost-but-not-quite human, and therefore downright repulsive, and Sandra said so in unladylike language. That the same reactions, in reverse, applied in the Telfan-Sandra relationship was not yet clear to her. Her language sounded more adapted to caisson workers, space-ship builders, or mule skinners than it did the luxury of her present abode.

Then at long and exasperating

last, the door opened gingerly and a serving woman entered.

"Well!" exploded Sandra. "Where have you been?"

The woman said something clear and articulate, which meant she was very sorry but which meant nothing to Drake. That made Drake boil merrily.

"Can't you speak Terran?" stormed Sandra.

The woman came into the room, followed by another.

"Who are you?" shouted Sandra. "Where's that other one—I can hardly tell you apart."

The first Telfan woman turned to her friend and said: "She's throwing another fit."

"She wants the Lady Thani. Thani is the only one who can speak much of her language."

"If I were Thani, I'd slip a thumb into each eye and pry."

"I wouldn't waste my time on that," returned the second woman. "I'd just make away with her and forget about it. I wouldn't care to have my sleep disturbed by blood, screams, and torture."

Sandra huffed up tall. "Will you two creatures stop gabbling at one another and get me Thani. Where is that creature?"

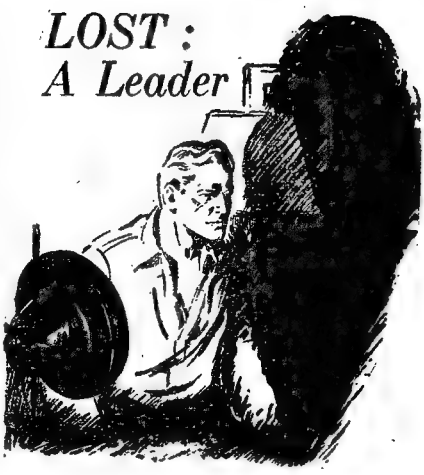
"Yes, she wants Thani. I heard her mention her name."

"If Thani isn't here, get me Tet'h. Or Gormal. Or Elyon."

"How can we tell her that Thani, Tet'h, Gormal, and Elyon went to meet the other Terrans?"

Sandra heard the names and the word *Terrans*. "Did they run off and leave me here?" she yelled.

LOST: A Leader



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DOC SAVAGE

AT ALL NEWSSTANDS

They shook their heads.

"Go . . . yes?" asked Sandra.

"Go . . . yes!" answered Delya.

"I want to go, too."

"I . . . go . . . no," said Delya.

"Not you, me."

"You . . . no?"

"Me . . . yes."

"Me . . . yes!" agreed Delya.

Sandra put both palms against her cheeks and gave vent to a yell of sheer frustration. Then she calmed once more. "Did every one of you that knows a word of Terran go?"

"Tonla, I think she's asking about Thani and the rest."

"But how can we tell her?"

"Do we want to? If all are like her—this Terra must be a bad, bad place indeed. And she is but a female. What must the males be?"

At this point it must be recorded that the first Interstellar incident was averted by Sandra Drake's refusal to work in learning the Telfan language. Drake's possible actions if she had been able to understand Delya's remark might have led to the First Interplanetary War. Amicable relations resulted from Sandra Drake's ignorance.

"After all," said Tonla, "they went because there isn't much of her language between all of them. All together they may be able to converse with the Terrans."

"And Elyon says that she is quite uninformed as to the technicalities of this device which will not work on Telfu. She inferred that these others know much about it. They are the ones to contact if Telfu is to gain. Why shouldn't they all go?"

"Had I the right, I'd have sent them," said Tonla. "We'd better get out of here before this woman gets violent. I think she's about to start throwing things."

"She should throw a fit," sneered Delya. "Only the very beautiful can behave in that arrogant manner."

"Or the very rich."

"Name it the very desirable. Thani is very desirable, and yet she does not raise hob with Tet'h. And Thani is not only beautiful, but she is wealthy, too."

"And Tet'h is not without his own desirability," smiled Tonla. "Nor his wealth. Beauty walks in the arms of grace. She has neither."

"Let's get out. And let us hope that all Terrans are not as nasty as this one."

"I fear, though. If I were a Terran, I'd never have come to get her," said Tonla. "Unless she and they are well met."

"Perhaps they are afraid of the bad impression she'll make if they leave her here."

"You hope for that?"

"No race could be that bad."

Sandra mustered enough coherency to ask another question. "How can I get to my friends?"

Much negation.

"Can't anyone understand me?"

More gestures of complete misunderstanding.

"Get out!" yelled Sandra, and then as they started to leave, Sandra exploded again. The slamming of the door coincided with the first

eruption, but the molten lava and hot ashes fell on an empty room.

"If she'd bothered to learn one word of Telfan, they'd have taken her," said Delya. "But they couldn't weigh down that little flier with one more—especially one who could be of no use to them. They'll return for her later."

"Too bad we can't put postage on her and mail her back to this Terra of hers."

"She'd come back stamped: 'Mail not wanted!'"

Sandra swore a few blood-curdlers and won her point by making an impression on the marble statue with the hard, sharp corner of a heavy metal box that stood on the table beside her bed. Then she ripped out of her pajamas and dressed quickly. She ran from her room and confronted the first man she met.

"Where are they?" she snapped.

He shook his head and pointed down the hall.

Drake followed the pointing finger to a large room. She stamped in, obviously interrupting some sort of governmental meeting.

"I want to go to my friends," she said imperiously.

The man at the head of the table shook his head sadly.

"I must go to them! Or," she asked superciliously, "are they coming here?"

More shaking of the patriarchal head.

"Can't you understand, either?" she stormed.

A shrug of the shoulder and a shake of the head gave Sandra to understand that she was speaking in an alien language to them.

"Crano!" she snapped. She didn't know its meaning, but it was the only Telfan word she knew, and she did know that it was a term signifying that the receiver of the epithet was slightly less than educated.

The elderly man went white. Two of the younger men arose, came forward, took Sandra Drake by the arms—one to each—and removed her from the chamber. They were not gentle, and on any inhabited planet employing the use of the Terran vernacular, she had been "Bounced!"

And Sandra knew it.

And then there came a bit of understanding. It hit hard. And in the brief minutes that Sandra looked facts in the face before she took to demanding impossible things once more, she realized that she had backed into her own trap. She had been demanding. She had chosen to teach those who met her the Terran language instead of learning Telfan. Now those who understood any bit of Terran had gone to meet the *Haywire Queen*, leaving her among those who could not understand her at all. She could not communicate her desires to any of them.

She could not even tell them of the desire that they wanted to hear: That she wanted to leave.

The whole city would have broken a blood vessel to get her out.

But they didn't talk the same language.

The *Haywire Queen* came down in a screaming, wild landing. She rifled down out of the sky, careening. She slanted for a half mile, and then squared away and came plummeting down vertically. Inside, the accelerometer was making wild gyrations as Timkins fought the controls.

The whistling of the big ship's passage through the air slid down the audible scale as the velocity dropped. The ship slowed, and came to a perfect landing—

Twelve feet above the surface!

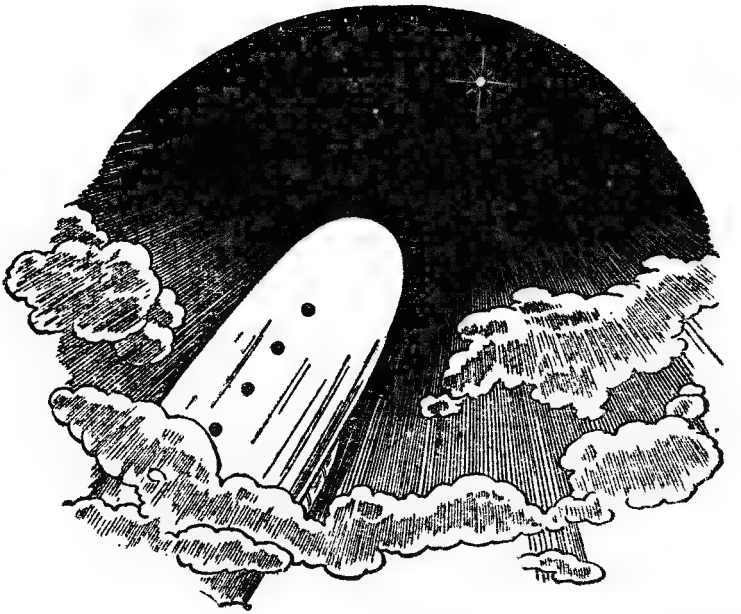
Like a slug of lead, the *Haywire Queen* poised for the barest instant, and then dropped the intervening distance. The landing plates sank into the soft soil of Telfu for several feet and the plates groaned, a rivet or two squeaked, and some welded joints disagreed. But spaceships are rigid structures, made for hard usage and considerable stresses and strains. It weathered the hard landing, though the angle was slightly cocked due to the unevenness of the turf's hardness. The *Haywire Queen* was still spaceworthy.

"Rotten pilot," muttered Hammond.

"Terrible," agreed McBride.

"Look, you two grinning apes. I missed Telfu by exactly one hundred and forty-four inches. Twelve feet in 2,630,000,000,000,000,000 feet. Well within the experimental error, I think."

"Twelve feet in nine light-years isn't bad," said McBride. "Some day, Larry, you can bend that mathematical mechanism you use



instead of a brain into calculating whether the landing effect would have been worse at *plus* twelve feet instead of minus."

"A mere matter of kinetic energy dissipated—"

"Yeah, we know. Well, you didn't kill us," laughed Hammond. "So let's go out and take a look at the wonders of the Telfan scenery."

"Take a quick look," said McBride. "Here come some Telfans to take a look at some Terran science."

"Wonder how they got here so quick," asked Timkins of no one in particular.

"Ask 'em."

Timkins stepped out of the space lock and smiled at the Telfans. "Ave, Canis Majoris," he said in a deep voice.

"Lousy Latin," snorted McBride.

"That's where they live."

"Do they know that?"

The foremost Telfan, who was Tet'h, stepped forward and smiled. "You . . . Terrans?"

"Yes."

He pointed to the ship. *"'Aywire Queen?"*

"Yes."

Tet'h smiled once more and offered his hand.

"Universal gesture?" asked Hammond.

"No. Drake must have taught them that."

"Drake?" asked Tet'h. "You like?"

"Extremely doubtful," said Hammond. He was misunderstood. McBride said nothing but that pinching of the nose between thumb and forefinger conveyed the idea excellently.

"Telfans . . . no like Drake."

"No?"

"No. Tall. Ugly-bald." Tet'h indicated his own luxurious pelt and then became confused as he realized that the Terrans were of the same, "Ugly-bald" complexion. He covered his face with both hands and muttered something that sounded apologetic and humble.

"Forget it," laughed McBride. "We . . . like Telfans."

"Not like Drake," said Tet'h.

"Thanks," said Hammond honestly.

"How know . . . here?" asked Timkins.

"You here?" asked Tet'h pointing to the ship and the surrounding landscape.

"Aren't we?" grinned Timkins.

"Save the fine rhetoric for later when they get the point of double talk," suggested Hammond.

Tet'h led them to the plane and Gormal and Elyon lifted a large case out. Tet'h opened it and handed McBride a little instrument. It was a cabinetless job, every part exposed.

"Holy spinach," he said. "A mechanogravitic detector."

Hammond got a small mechanical planetarium showing Telfu and a minute sphere. Tet'h pulled a roller-map out of the base and indicated Telfu and the sphere. The map was a fairly accurate contour map of the blanketed region's contour.

Tet'h signified the cusp and then

pointed to the position of Soaky. Below the cusp, Tet'h indicated the planet and then pointed to the ground.

"Here," he said.

McBride and Hammond tangled in an effort to shake Tet'h's hand. The Telfan looked proud.

"Many years," he said haltingly. "Work," indicating the detector. He made assembly motions. He pulled a book of mathematical identities from a pocket and said: "Found . . . here." Then he made vast motions indicating a large construction. "Many years . . . try like hell . . . no work." He indicated the small satellite. "He make stop."

"Bright lads," grinned Hammond. "Their civilization was ready to discover the gravitic spectra. They did. They found it in math. They tried it and it didn't click too well. They discovered why. Never having anything of any great power operating, they never got to the point where they could build anything big enough to get off of Telfu. Just plain stuck. Well, fellers, if that moonlet is cupralum, I can see a lot of birds mining it."

"How're they going to land on it? Nothing gravitic will be worth a hoot that close."

"Lift 'em off the dead spot by battery-powered gravitics. Inefficient as hell. Get into space and then use rockets to land on that moonlet. Mine it. Load it full of detonite and blast."

"A hundred-mile moonlet?"

"They've got a nine-thousand-mile planet here to support it. They can't power their machinery with gravitrons, but electronics is an art worth remembering. One of the earlier atomic gadgets would do plenty."

"Might bore a large hole in it and pack in a mile of Atomite," suggested McBride. "I'd hate to support that, though."

"Better get some seetee meteors and pelt it by remote control," said Hammond. "Well, we can cover that later." To Tet'h he said: "You come in?"

Tet'h and Thani held a quick conference. "She come, too?" he asked.

"All of you."

"No. They stay. We go Terra."

"Terra!" exploded Hammond.

"Much to learn—both of us. You and I. You learn Telfan. We learn Terran. Better talk. This . . . lousy."

"Easy to see Sandra's delicate hand in this language lesson," grinned Timkins.

"Better call that wild woman. Tell her we're going to take off in one hour and ten minutes because if we don't, we'll be as stuck as she is and we don't like that. As long as we have a bit of Telfu to take back with us in the shape of Tet'h and his woman Thani, we needn't stick around. I'll feel better about getting off on this rotation anyway. G'wan, we'll listen to you make the excuses, Larry."

"My turn to poke her on the pretty little schnozzola?"

"You won that by that three times something to the minus umpty-

umpth power percentage of landing error. Twelve feet in what?"

"2,630,000,000,000,000,000 feet."

"Was that the same he said before?" asked McBride with a smile. "Or was he working that old gag about our not remembering?"

"I don't remember either."

"So, you win," said McBride to Larry Timkins.

Timkins called, and Sandra Drake's slightly hysterical voice replied.

"How you doing?" asked Larry.

"Where are you?"

"I don't know."

"Don't know?" said Sandra. Her voice went up in a cresendo and hit "G" above High "C" on the last note.

"No," said Larry. "Chicago, Venuland, Canalport, and Sharon are my best landmarks and they're all equally distant and in the same direction from here."

"Go to hell."

"That's across the River Styx from Sharon, on Pluto," said Timkins. "And that expression is making the Sharonites unhappy because people have been going there for thousands of years. Sharon hasn't the popularity."

"But look, Larry, I want to go along."

"Can you get here in one hour and eleven minutes. That's the absolute deadline until we can get to Terra and cook up a drive that's detuned enough from the cupralum-absorption region to permit us to tinker off and on around here."

"Where are you? How can I

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AT ALL NEWSSTANDS

get there if you don't know where you are?"

"Ask someone."

Sandra's language became something that the communications commission has legislated against.

"Can you come here and get me?"

"We'll be doing fine if we get off with our skin," said Larry. "We definitely have not enough power to go roaming all over Telfu. We're on the one spot that will allow us to leave under the emergencies. An hour and thirty minutes from now that spot will be somewhere else. We'll wait an hour and ten and take off on the edge of the spot."

"Won't they come back and get me?"

"Wait a minute." Then he turned to Tet'h. "Could you send them back for Drake?"

"Yes," answered Tet'h. "Better not, though. She bad . . . but lazy. Teach Terran so not . . . learn Telfan."

"Sandra? No dice. That's it, toots. Take it or leave it."

"Look, Larry, isn't there something you can do?"

"I doubt it. Give you a tip, though. Next time you poke someone else's nose into a mess remember that he who laughs last isn't always too dumb to catch on quick. At the next sound, it will be exactly three people making with deep belly laughs. So long, until we meet again—in about six months! Inyou, we're at these Telfan co-ordicidentally, if you should find someone who would like to get rid of nates: South Longitude . . . Hey, Tet'h, how do you pronounce these figures?"

Tet'h caught his meaning and said: "Me tell."

He addressed the microphone, and spoke in Telfan. "There," he finished, "is where . . . are!"

Timkins added: "So now you can get here all right."

He closed the mike as the speaker started to make little animal sounds. "Fellows," said Larry. "She's mad!"

"Crazy mad or angry mad?"

"Boiling mad."

"She'll be hard-boiled by the time she gets through stewing in her own juice," grinned Hammond. "Let's get some sky, fellows. O.K. . . . we go?" he asked Tet'h.

"We go," said Tet'h cheerfully.

There was a quick conference between the two men who were to stay and Tet'h. Then the air-lock door was closed, and Timkins started to set up the controls.

Up in the emergency room, the batteries started to fume and fret as the terrible overload hit them. The *Haywire Queen* lifted uncertainly, gained a little speed, and then took off into the cloudless sky at an acceleration that varied continuously between nine to twenty feet per second per second per second under the super drive.

Not too long after, the gravitroncupralum drive took over, and the *Haywire Queen* pointed her dome upwards at tiny Sol, blinking there in the sky between the constellations Aquila and Ophiuchus.

THE END.

ibis plant was a very delicate thing—in some ways. A sensitive flower. But so utterly unkillable that geologic time hadn't been able to exterminate it or its tremendous urge.

The Harmonizer

by A. E. VAN VOGT

Illustrated by Kramer

After it had sent two shoots out of the ground, the ibis plant began to display the true irritability of intelligent living matter: It became aware that it was growing.

The awareness was a dim process, largely influenced by the chemical reaction of air and light upon the countless membranes that formed its life structure. Tiny beads of acid were precipitated on these delicate colloidal films. The rhythm of pain-pleasure that followed surged down the root.

It was a very early stage in the development of an ibis plant. Very. Like a newborn puppy, it reacted to stimuli. But it had no purpose as yet, and no thought. And it was not even dimly aware that it had been alive previously.

Slash! Snip! The man's hoe caught the two silvery shoots, and severed them about two inches below the ground.

"I thought I'd got all the weeds out of this border," said the man.

His name was Wagner, and he was a soldier scheduled to leave for the front the next day. He didn't actually use the foregoing words,

but the gist of his imprecation is in them.

The ibis plant was not immediately aware of what had happened. The series of messages that had begun when the first shoot pushed up through the soil, were still trickling down the root, leaving the impact of their meaning on each of a multitude of colloidal membranes. This impact took the form of a tiny chemical reaction, which in its small way caused a sensation.

Instant by instant, as those messages were transmitted by the slow electricity that obtained in the membranous films, the ibis plant came more alive. And tiny though each chemical consciousness was in itself, *no subsequent event could cancel it in the slightest degree.*

The plant was alive, and knew it. The hoeing out of its shoots and the upper part of its root merely caused a second wave of reactions to sweep downward.

The chemical effect of this second wave was apparently the same as the earlier reaction: Beads of acid composed of not more than half a dozen molecules each, formed on the colloid particles. The reaction seemed the same, but it wasn't. Before, the plant had been excited, almost eager.

Now, it grew angry.

After the manner of plants, the results of this reaction were not at once apparent. The ibis made no immediate attempt to push up more shoots. But on the third day, a very curious thing started to happen. The root near the surface came alive with horizontal sub-roots. These pushed along in the soil darkness, balancing by the simple process of being aware, like all plants, of gravitation.

On the eighth day, one of the new roots contacted the root of a shrub. And began to wind in and around it. Somehow then a relation was established, and on the fifteenth day, a second set of shoots forced the soil at the base of the shrub, and emerged into the light.

The radical, the astounding thing about this second set of shoots was that they were not of a silvery hue. They were a dark green. In color, shape and texture the leaves, as they developed seemed more and more exact duplicates of the leaves of the shrub.

Rapidly the new shoots shot up. As the weeks sped by, the "fear" that had induced chameleonism faded, and the leaves reverted to their silver color. Slowly, the plant became conscious of human and animal thoughts. But not till two hundred days later did the ibis begin to show its basic sensitivity.

The reaction which followed was as potent and far reaching as had been the results of that same sensitivity in its previous existence.

That was eighty million years before.

The ship, with the ibis plants aboard, was passing through the solar system when the catastrophe happened.

It came down onto an earth of marsh, fog and fantastic reptilian monsters. It came hard and out of

control; its speed as it struck the thick atmosphere was approximately colossal. And there was absolutely nothing that the superbeings aboard could do about it.

What had occurred was a precipitation of the matter held in suspension in the drive chambers. As a result of the condensation, the crystalloids in the sub-microscopic twilight zone above the molecule state lost surface area. Surface tensions weakened to a tenth, a hundredth, a thousandth of what was necessary. And at that moment, by the wildest accident, the ship passed near Earth and tangled with the dead mass of the gigantic planet's magnetic field.

Poor ship! poor beings! Crashed now, dead now nearly eighty thousand thousand years.

All that day and night, remnants of the ship burned and fused, and flared again, in a white, destroying incandescence. When that first, fire-shattered darkness ended, not much remained of what had been a mile-long liner. Here and there over the Cretaceous land and water and primeval forest, unburnt sections lay, jagged lumps of metal rearing up towards the perpetually muggy heavens, their lower parts sunk forever into a thick fetid soil that would eat and eat at their strength until at last, the metal defeated, its elements would dissolve into earth and become earth.

Long before that happened, the ibis that were still alive had reacted to the dampness, and sent creepers out over the broken metal of what had been their culture room, out to-

wards the gaping holes that opened into the soil.

There had been three hundred plants, but in that last terrible period before the crash, some effort had been made to destroy them.

Altogether eighty-three ibis survived the deliberate attempt at their destruction; and among them there was a deadly race to take root. Those that came last knew instinctively that they had better move on.

Of these latter, weakened by an injury in the crash, was *the* ibis. It reached the life-giving earth last of all. There followed a painful and timeless period when its creepers and its roots forced their way among the massed tangle of its struggling fellows, towards the remote edge of the gathering forest of silver shrubs.

But it got there. It lived. And, having survived, having taken possession of a suitable area in which to develop without interference, it lost its feverishness, and expanded into a gracious silver-hued tree.

A hundred, a hundred and fifty, two hundred feet tall it grew. And then, mature and satisfied, it settled down to eternal existence in a grotesque yet immensely fertile land.

It had no thought; it lived and enjoyed and experienced existence. For a thousand years no acid beads formed on its colloidal membranes except the acids of reaction to light, heat, water, air and other extrania of simply being alive.

The idyllic life was interrupted one gray soggy morning by a dull but tremendous thunder and a shaking of the ground. It was no minor earthquake. Continents shook in the throes of rebirth. Oceans rushed in where had been land; and land surged wetly out of the warm seas.

There had been a wide expanse of deep marsh water separating the forest of ibis trees from the mainland. When the shuddering of a tortured planet ended in the partial stability of that uneasy age, the marsh was joined to the distant higher ground by a long, bare, hill-like ridge.

At first it was merely mud, but it dried and hardened. Grass sprouted and shrubs made a tangle of parts of it. Trees came up from drift seed; the young growth raced for the sky and simultaneously waged a bitter battle for space, but all that was unimportant beside the fact that the ridge existed; the gap that isolated the ibis had been bridged.

The new state of things was not long in manifesting. One timeless day a creature stamped boldly along the height, a creature with a rigidly upheld armored tail, teeth like knives and eyes that glowed like fire with the fury of unending bestial hunger.

Thus came *Tyrannosaur Rex* to the peaceful habitat of the ibis, and awakened from a latent condition a plant that had been cultivated and developed by its creators for one purpose only.

Animals were no new thing to the ibis trees. The surrounding marshes swarmed with great placid vegetarians. Gigantic snakes crawled

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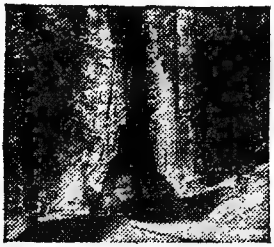

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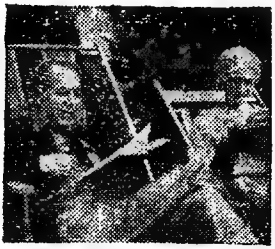

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4 THINGS TO DO to keep prices down and help avoid another depression

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2. When you buy, pay no more than ceiling prices. Pay your ration points in full.

3. Keep your *own* prices down. Don't take advantage of war conditions to ask for more — for your labor, your services, or the goods you sell.

4. *Save.* Buy and hold all the War Bonds you can afford—to help pay for the war and insure your future. Keep up your insurance.

A United States war message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America

among the ferns at the water edge, and writhed through the muddy water. And there was an endless scurrying of young, almost mindless, beasts in and out among the silver trees.

It was a world of hungry life, but the hunger was for vegetation, or for living things that were scarcely more than plants, for the long lush marsh grass, the leaf-laden shrubs, the soggy roots of water plants, and the plants themselves, for primitive fish, for wriggling things that had no awareness of pain or even of their fate. In the quiet torpor of their existence, the plant-eating reptiles and amphibians were little more than Gargantuan plants that could move about.

The most enormous of all these well-behaved creatures, the long-necked, long-tailed brontosaurus, was eating away on the generous leaves of a tall fern on the morning that the flesh-eating dinosaur stalked onto the scene with all the tact of a battering ram.

The struggle that followed was not altogether one-sided. The brontosaurus had, above everything else, weight and a desire to get out of there.

The process of getting was made especially difficult by the fact that *Tyrannosaur Rex* had his amazing teeth sunk into the thick lower part of the big fellow's neck; and also in some unsubtle fashion he had dug his claws into the thick meat of the great slab of side to which he was clinging. Movement for the brontosaurus was strictly limited by the necessity of carrying along the multitonned dinosaur.

Like a drunken giant, the great beast staggered blindly towards the marsh water. If it saw the ibis tree, it was a visualization that meant nothing.

The crash knocked the brontosaurus off its feet, a virtual death sentence for a creature that, even under the most favorable circumstances required ten minutes to recover from such an unbalanced prostration.

In a few minutes, the dinosaur administered the *coup de grâce;* and, with a slobbering and bloody ferocity, started gorging.

It was still at this grisly meal half an hour later when the ibis began reacting in a concrete fashion.

The initial reactions had begun almost the moment the dinosaur arrived in the vicinity. Every sensitive colloid of the tree caught the blasts of palpable lusts radiated by the killer. The thought waves of the beast were emitted as a result of surface tensions on the membranes of its embryo brain; and as these were electric in nature, their effect on the delicately balanced films of the ibis' membranes was to set off a feverish manufacture of acids.

Quadrillions of the beads formed; and, though once again they seemed no different from similar acids created as a result of other irritations, the difference began to manifest itself half an hour after the brontosaurus grunted its final agony.

The ibis tree and its companions exuded a fragrance in the form of billions on billions of tiny dust

motes. Some of these motes drifted down to the dinosaur, and were gulped into its lungs from where, in due course, they were absorbed into its bloodstream.

The response was not instantly apparent. After several hours, the dinosaur's gigantic stomach was satiated. It stalked off to wallow and sleep in a mudhole, quickly made extraodorous by its own enormous droppings and passings, a process that continued as easily in sleep as during consciousness.

Waking, it had no difficulty scenting the unrefrigerated meat of its recent kill. It raced over eagerly to resume feeding, slept and ate again, and then again.

It took several days for its untiring digestion to absorb the brontosaurus to the extent that it was once more ravenously hungry.

Oddly, then, it didn't go hunting. Instead, it wandered around aimless and terribly restless, looking for carrion. All around, amphibians and snakes moved and had their being—ideal prey. The dinosaur showed no interest.

Except for hopelessly inadequate carrion of small reptiles, it spent the next week starving to death in the midst of plenty.

On the fifteenth day a trio of small, common dinosaurs came across its wasted body, and ate it without noticing that it was still alive.

On the wings of a thousand breezes, the fragrant spores drifted. There was no end to them. Eighty-three ibis trees had started manu-

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facturing that for which they had been created; and, once started, there was no stopping.

The spores did not take root. That wasn't what they were for. They drifted; they hung in the eddies above quiet glades, sinking reluctantly towards the dank earth, but always swift to accept the embrace of a new wind, so light, so airy themselves that journeys halfway around the earth proved not beyond their capabilities.

In their wake they left a trail of corpses among the killer reptiles. Once tantalized by the sweet-scented motes, the most massive murderers in the history of the planet lost their brutality, their will to kill—and died like poisoned flies.

It took time of course, but of that at least there was a plenitude. Each dead carnivore provided carrion meat for the hungry hordes that roamed the land; and so after a fashion, over the decades, tens of thousand of individuals lived on because of the very abundance of dead meat eaters.

In addition there was a normal death rate among the non-meat eaters that had always provided a measure of easy food; and since there were fewer meat eaters every year, the supply of meat per capita increased, at first gradually, and then with a suddenness and totality that was devastating.

The death of so many killers had created an imbalance between the carnivore and their prey. The vegetarians in their already huge numbers began to breed almost without danger. The young grew up in a world that would have been idyllic except for one thing: There was not enough food.

Every bit of reachable green, every root, vegetable and shoot was snatched by eager jaws before it could begin to mature.

For a time the remnants of the killers feasted. And then, once more, a balance was struck—that ended again and again as the prolific vegetarians dropped their young into a world made peaceful by the exudation of plants that couldn't stand brutality, yet felt nothing when death came by starvation.

The centuries poured their mist of forgetfulness over each bloody dip of that fateful seesaw. And all the while, as the millenniums slipped by, the ibis maintained their peaceful existence. For long and long it *was* peaceful, without incident of any kind. For a hundred thousand years the stately silver trees stood on their almost-island, and were content.

During that vast expanse of time, the still unstable earth had rocked many times to the shattering and re-forming fury of colossal earthquakes, but it was not until they were well into their second hundred thousandth year that they were again affected.

A continent was rift and torn. The gap was about a thousand miles long, and in some places as much as twenty-five miles deep. It cut the edge of the island, and plummetted *the* ibis tree into an abyss three miles deep.

Water raged into the hole, and

dirt came roaring down in almost liquid torrents. Shocked and buried, the ibis tree succumbed to its new environment. It sank rapidly to the state of a root struggling to remain alive against hostile forces.

It was three thousand years later that the second last act of the ibis trees was played out on the surface of the planet.

A ship clothed in myriad colors slipped down through the murk and the gloom of the steaming jungle planet that was Cretaceous earth. As it approached the silverhued grove, it braked its enormous speed, and came to a full stop directly over the island in the marsh.

It was a much smaller machine than the grand liner that had crashed to a fiery destruction so many, many years before. But it was big enough to disgorge, after a short interval, six graceful patrol boats.

Swiftly, the boats sped to the ground.

The creatures who emerged from them were two-legged and two-armed, but there the resemblance to human form ended.

They walked on rubbery land with the ease and confidence of absolute masters. Water was no barrier; they strode *over* it as if they were made of so much buoyant fluff. Reptiles they ignored; and for some reason, whenever a meeting threatened, it was the beasts that turned aside, hissing with fear.

The beings seemed to have a profound natural understanding of purposes, for there was no speech among them.

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Send your entry to Contest Editor at the address shown below.

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Without a sound or waste motion, a platform was floated into position above a small hill. The platform emitted no visible or audible force, but beneath it the soil spumed and ripped. A section of the drive chamber of the old, great ship catapulted into the air, and was held captive by invisible beams.

No dead thing this. It sparkled and shone with radiant energy. Exposed to the air, it hissed and roared like the deadly machine it was. Torrents of fire poured from it until something—*something green*—was fired at it from a long gunlike tube.

The greenness must have been a-energy, and potent out of all proportion to its size. Instantly, the roaring, the hissing, the flaring of the energy in the drive chamber was snuffed out. As surely as if it were a living thing mortally struck, the metal lost its life.

The super-beings turned their concentrated attention on the grove of ibis trees. First they counted them. Then they cut incisions into several roots, and extracted a length of white pith from each. These were taken to the parent ship, and subjected to chemical examination.

It was in this way that the discovery was made that there had been eighty-three trees. An intensive search for the missing tree began.

But the mighty rent in the planet's great belly had been filled in by drift and mud and water. Not a trace of it remained.

"It must be concluded," the commander noted finally in his logbook, "that the lost ibis was destroyed by one of the calamities so common on unfinished planets. Unfortunately great damage has already been done to the natural evolution of the jungle life. Because of this accelerated development, intelligence, when it finally does emerge, will be dangerously savage in its outlook.

"The time lapse involved precludes all advance recommendations for rectification."

Eighty million years passed.

Wagner hurried along the quiet suburban road and through the gate. He was a thick beefy soldier with cold blue eyes, coming home on leave; and at first, as he kissed his wife, he didn't notice that there had been bomb damage to his house.

He finally saw the silver tree.

He stared.

He was about to exclaim, when he noticed that one whole wing of the house was an empty shell, a single wall standing vacuously in a precarious balance.

"Die!-!?!-!?!? Americannerin!" he bellowed murderously. "!-!?-! !?!-?-!"

It was less than an hour later that the sensitive ibis tree began to give off a delicious perfume.

First Germany, then the rest of the world breathed the spreading "peace."

It all worked out as beautifully as that.

THE END.

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